A STUDY TO ASSESS THE EFFECTIVENESS OF STRETCHING EXERCISES ON PAIN, SYMPTOMS AND PERFORMANCE OF ACTIVITY OF OLD AGE PEOPLE WITH KNEE OSTEOARTHRITIS IN A SELECTED OLD AGE HOME AT ERODE"

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SULUR, COIMBATORE

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI – 32.

MASTER OF SCIENCE IN NURSING

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CERTIFICATE

This is to certify that this dissertation titled **"A STUDY TO ASSESS THE EFFECTIVENESS OF STRETCHING EXERCISE ON PAIN SYMPTOMS AND PERFORMANCE OF ACTIVITY OF OLD AGE PEOPLE WITH KNEE OSTEOARTHRITIS IN A SELECTED OLD AGE HOME AT ERODE ." "** is the bonafide work done by Ms. **Binu.P.C**., R.V.S College of Nursing, R.V.S Educational Trust, Sulur, Coimbatore, submitted to the Tamil Nadu Dr. M.G.R Medical University, Chennai – 32, in partial fulfillment of the requirement for the award of the degree of M.Sc (Nursing) Branch I – Medical Surgical Nursing under our guidance and supervision during the academic period from 2010 – 2012.

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"A study to assess the effectiveness of stretching exercises on pain , symptoms and performance of activity of old age people with knee osteoarthritis in a selected old age home at Erode. "

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In partial fulfillment of the requirements for the degree of
Master of Science in Nursing

ABSTRACT

"A study to assess the effectiveness of stretching exercises on pain, symptoms and performance of activity of old age people with knee osteoarthritis in a selected old age home at Erode."

The aim of the study is to assess whether stretching exercises make any difference in the degree of pain, symptoms and performance of activity of old age people compared to those who did not receive the stretching exercises for osteoarthritis.

The conceptual frame work used in this study was based on the Callista Roy's Adaptation Theory (1996).A non equivalent quasi experimental pre and post intervention two groups design was used. The sample size consisted of 40 inmates of the old age home (20 samples in experimental group and 20 in control group), selected by purposive sampling technique. The experimental group was taught calf muscle and quadriceps stretching exercises. They practiced the exercises every day for 15 minutes in the presence of the investigator for 30 days.

Pre and post intervention assessment of pain, symptoms and performance of activity was done by using a modified rating scale; knee outcome and osteoarthritis score (KOOS). The data was analyzed using descriptive and inferential statistics.

Major findings of the study were - In the experimental group 20 (100%) samples had moderate pain and after the intervention pain reduced to mild for 18(90%) samples. And 2(10%) samples it remained the same. In the control group there were no changes in the degree of pain between the baseline and at subsequent observation on 30th day. In the experimental group, after the intervention the mean score of pain reduced from 21.55 to 15.30.

In the experimental group before the intervention 13 (65%) samples had mild and 7 (35%) samples had moderate knee stiffness. After the intervention all the 20(100%) samples showed only mild knee stiffness. In the experimental group before the intervention only 1 to 2 samples had moderate degree of knee grinding and clicking and knee movements and the rest (90-95%) of the sample had the mild degree of knee grinding and clicking and knee

movements. After the intervention no significant change was observed in knee grinding and clicking and knee movements. In the experimental group, before the intervention the mean score of symptoms of knee stiffness was 8.95. After the intervention the mean score of symptom of knee stiffness reduced to 6.65.

In the performance of activities there was a significant improvement observed in the experimental group. The mean score of house hold activities was 5.80 and it reduced to 4.15 after the intervention. The mean score of outdoor activities was 5.75 and reduced to 4.10 after the intervention. The daily activity was 10.55 and it reduced to 8.15 after the intervention. The knee movement was 9.90 and 7.85 after the intervention.

There was no significant association between the demographical data and symptoms showing by the old age people. ($t=13.01^*$, $df=37$, $p< 0.815$).

This study concluded that stretching exercises had a significant effect in improving performance of activity and reduction of pain and symptoms among the aged people staying in old age home.

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INTRODUCTION

BACKGROUND OF THE STUDY

Ageing is a normal process of time related to change, begins with birth and continues through the life .A man's life is normally divided into five main stages namely infancy, childhood, adolescence, adulthood and old age. In each of these stages an individual has to find himself in different situations and face different problems. In old age physical strength deteriorates, mental stability diminishes; money power becomes bleak coupled with negligence from the younger generation.

Ageing is a process that converts healthy adults into frail ones, with diminished reserve in most physiological systems and an exponentially increasing vulnerability to most diseases and death. **Miller (1994)**

Ageing affects both the body and the mind. Some age-related changes start as early as the 20s; others may not appear until people are in their 70s. Although aging is inevitable, people age at different rates. Age-related changes eventually lead to the increased probability of death as people grow older. Age is the strongest predictor of the disease and therefore increasing age and extended life expectancy will result in a greater occurrence of the disease.

World elderly population has been growing for centuries. The size of the elderly population of age 60 years and above will cross one billion in 2020. In India, since 1961, a sharp decline in the overall death rate, mortality levels in the older age group as well as increased life expectancy initiated a process of ageing. Census data in 1991 showed 55 million persons above the age of 60 representing 6.5% of total population. It has been estimated that nearly 75% of aged persons are living in villages. 48.2% of old aged people are women, among them 55% are widows. One third of the people are living below the poverty line. Nearly 66% of elderly people are living without adequate food, shelter and clothing.

Ageism is described as a process of systematic discrimination and stereotyping of the aged. **Butler (1999).**The aging process will affect the old age people physically, psychologically, socially and spiritually.

Bodily changes associated with ageing generally make people more vulnerable to environmental conditions, side effects of medications, and complications of medical procedures. Changes in the regulation of the body systems increase the diversity among older people. Certain physical signs marked an individual as old: toothlessness, balding or grey hair, hunched back, lameness, deafness. Increasing debility is the clearest signal that one was becoming old.

Psychologically ageing affects the people. They become more depressed and tired due to different kinds of diseases and may be because of loss of the spouse or retirement. Losing mental function is perhaps the most feared aspect of ageing. In fact, the fear itself often begins to wear down their quality of life.

The vast majority of deaths occur in people 65 years of age and older and more than half of these are caused by chronic illnesses such as heart diseases, cancer and stroke. In 2004, Alzheimer's disease is ranked eighth and accounted more than 58000 deaths.

Ageing brings changes in the muscles and bones. Muscle mass declines progressively after the age of 40. Hand-grip strength declines 45% by the age of 75. This, however, may be due to inactivity, nutritional deficiencies, disease, or other conditions rather than the ageing process itself. Cartilage, the substance that lubricates the joints, becomes less able to adapt to repetitive stress .When a person grows older the cartilage that serves as shock absorber between bones and can no longer sustain the rubbery and become stiff. It also loses its elasticity and becomes damaged when these cartilages and ligaments wear out and cause joint disease. **Pekker(2004**).

Osteoarthritis is a condition in which the cartilage that acts as a cushion between bones in joints begins to wear out, causing inflammation and pain in joints, thereby restricting movement. There are more than 100 different types of arthritis. The most

common type of arthritis is osteoarthritis or degenerative joint disease. The disease most commonly affects the middle-aged and elderly, although it may begin earlier as a result of injury or overuse. It is often more painful in weight bearing joints such as the knee, hip, and spine than in the wrist, elbow, and shoulder joints. All joints may be more affected if they are used extensively in work or sports, or if they have been damaged from fractures or other injuries**. Saloni tanna(2004)**

Literature shows clear improvement of osteoarthritis symptoms in patients undertaking exercise programs. Decreased pain and increased muscle function have been reported for both stretching and aerobic exercises. However, these effects do not persist if exercise programs are discontinued. Thus, the motivation of the patient to start and continuously practice exercise is of crucial importance. Many patients suffering from OA refuse to start exercising due to joint pain. In such cases, the use of painkillers during the first weeks of an exercise program might not only facilitate joint movement but can also drastically improve patient compliance. Exercise has been shown to improve pain and function in OA and is recommended by the Osteoarthritis Research Society International **(OARSI**) for the management of hip and knee osteoarthritis.

NEED FOR THE STUDY

Osteoarthritis (OA) is a common, chronic condition that affects older adults. Age is the greatest risk factor for Osteoarthritis. It begins in the third decade of life and peaks between the fifth and sixth decades. Prevalence of Osteoarthritis is about 70% in the people between the ages of 55 and 74 years. By 40 yrs of age, 90% of the populations have degenerative joint changes in their weight bearing joints, even though clinical symptoms are usually absent. Osteoarthritis is a major cause of disability in both the developed and developing world. With the population aging, the prevalence of osteoarthritis is increasing and its consequences are having an impact on society. This is one of the reasons why osteoarthritis has been adopted as a major focus¨

Osteoarthritis affects one's physical ability and that it has the potential to impair one's normal functioning. It may lead to substantial difficulties in walking and being able

to get around both in the home and outdoors. When the knee is affected the joint may become unstable, increasing the risk of falls, particularly in elderly people. Also the poor balance and flexibility contribute to falls and broken bones. These fractures can result in significant disability and, in some cases, fatal complications. In most of the old age home people are not getting any medical facilities. Due to the fear of joint pain, stiffness, they limit the movements and also lack of physical and recreational activities causing condition becomes worse and more serious, and finally leads to disability.

The residents of old age homes feel depressed and anxious because of the fact that they have limited social activities. Lack of support and love of the families may be a major reason. The visits paid by the family members to old age homes were also minimal. Such circumstances have a profound effect on the psychological state of respondents, which made them feel isolated and lonely. The extent of help or assistance in old age homes was also not provided to all the respondents, which forced them to indulge in activities, which needed mobility inspite of having joint pains.

Family is the main source of care provider to all its members. One's need for and ability to give care is negotiated by one's place in family lifecycle. Ageing of population is an obvious consequence of the process of demographic transition .In a globalizing world, the meaning of old age is changing across cultures and with in countries and families **(Bergeron 2001**).

Nowadays with senior citizens being considered as "non-productive" and thought to be a social and economic burden. The role of families in case of older persons has declined due to structural changes, which have taken place in the Indian society and the concomitant disintegration of the joint family system, which results in the rejection or neglect of the aged. This has lead to the shift of the old person from the family to the old age homes. People go to institutions mainly because they have no relatives to care for them. Thus, the individuals look out for an accommodation, due to isolation or loneliness, for relocation of congregate – style accommodation which may increase their social contact and have a positive impact on their well- being **(Bergeron 2001).**

Studies revealed that more than half of the residents in the old age home were suffering from at least one chronic illness. Hypertension, gastritis and arthritis, cardiac problems, diabetes, joint pain, kidney infections, cancer, tuberculosis etc were the most common diseases. Lack of trained human resources and financial constraints were the major issues for the efficient management of health problems. Once they occur, this disease may take a long time to heal due to old age.

Unal Ayranci(2005) University of Osmangazi conducted a study to evaluate the elderly health status, existing health problems, and feelings about old age and death in one of the Turkish old age home. The result of the study indicated that the health status was bad and were suffering with hypertension, diabetes mellitus and joint related problems. And that they were not satisfied with their place of residence.

All these elderly citizens are in need of urgent attention! They do not need our pity, but the understanding love and care of their fellow human beings. It is our duty to see that they do not spend the twilight years of their life in isolation, pain and misery. Older persons are, therefore, in need of vital support that will keep important aspects of their lifestyles intact while improving their over-all quality of life **(Dandekar 1993).**

Most patients with osteoarthritis seek medical attention because of pain. The safest initial approach is to use a simple oral analgesic such as acetaminophen .If pain relief is inadequate, oral non steroidal anti-inflammatory drugs or intra-articular injections of hyaluronic acid–like products should be considered. Attention must also be given to non pharmacologic measures such as patient education, weight loss and exercise, nutritional counseling, heat and cold therapy, joint protection by wearing braces and assistive devices. Relief of pain and restoration of function can be achieved in some patients with early osteoarthritis, particularly if an integrated approach is used. Patients with advanced disease may eventually require surgery, like joint replacement which generally provides excellent results.

Even though joint replacement provides excellent results, it is very costly .So it is not affordable for the poor people. Among the non pharmacological management, exercise is the one of the cost effective and easy method to use for all the type of people to prevent joint pain and joint stiffness.

Therefore, exercises are a part of a comprehensive arthritis treatment plan, which can help in improving the joint mobility, muscle strength and over all physical condition and healthy wellbeing. These exercises may include walking, swimming or other water activities, yoga, and other stretching exercises, or isometric exercises. Some of these exercises and life style modifications help to maintain normal joint function by increasing and preserving joint mobility and flexibility.

Nobuhiro Tsumura,Aiko Kimura A(2008) Kobe University conducted a study on Home Stretching Exercise is Effective for Improving Knee Range of Motion and Gait in Patients with Knee Osteoarthritis. Outcomes showed that there was a significant change in the total range of knee range of motion and pain after the intervention.

From the literature review it is quite evident that stretching exercise plays a major role in the management of knee osteoarthritis. A program of physical therapy emphasizes the importance of stretching all muscles that cross the given joint affected by osteoarthritis. Stretching exercises improve the functional mobility of the joints in old age people. When the mobility increases joint pain decreases. And these stretching exercise does not take much time, requires no special equipments except comfortable place to do. Hence the investigator is interested in observing the effect of a regular stretching exercise programme in reducing the pain, symptoms and improving the performance of activities.

STATEMENT OF THE PROBLEM

A study to assess the effectiveness of stretching exercises on pain, symptoms and performance of activity of old age people with knee osteoarthritis in a selected old age home at Erode.

AIM OF THE STUDY

Aim of the study is to assess whether stretching exercises makes any difference in the degree of pain, symptoms and performance of activity of old age people compared to old age people who did not receive the stretching exercises for osteoarthritis.

SPECIFIC OBJECTIVES

1. To assess and compare the degree of pain in experimental and control group before and after stretching exercises.
2. To assess and compare the degree of symptoms in experimental and control group before and after stretching exercises.
3. To assess and compare the level of performance of activity in experimental and control group before and after stretching exercises.
4. To associate the selected demographic variables with the symptoms of old age people in experimental group before the stretching exercises.

HYPOTHESES

Research hypotheses

H1 - There is a significant difference between the mean score of pain in the control and experimental group after the intervention.

H2 - There is a significant difference between the mean score of symptoms in the control and experimental group after the intervention.

H3 -There is a significant difference between the mean score of performance of activities is control and experimental group after the intervention.

H4 -There is an association between the selected demographical variables and the degree of symptoms in the control and experimental group before the intervention.

OPERATIONAL DEFINITIONS

1) Stretching exercise

It is a form of physical exercise in which a specific skeletal muscle or muscle group is deliberately elongated to its fullest length by extending the knees, joints in order to improve their muscle elasticity. In this study it includes calf muscles stretch and quad muscle stretch.

2) Effectiveness

It is the extent to which the stretching exercises have reduced the pain, relieved the symptoms and increased the ability to perform activities. All these are measured by using modified KOOS rating scale.

3) Pain

It is a subjective feeling of discomfort verbalized by patient measured by modified KOOS rating scale.

4) Symptoms

Symptoms are what is experienced by a person as a result of a disease process which is expressed on questioning and measured by modified KOOS rating scale.

5) Performance of activity

It is the ability to carry out the activities like walking; climbing up the stairs, standing and house hold activities like dusting, washing etc measured by modified KOOS rating scale.

6) Knee Osteoarthritis

It is a degenerative joint disease affecting unilateral or bilateral knees characterized by progressive loss of joint cartilage that leads to pain, joint stiffness, joint swelling, joint instability and muscle weakness.

ASSUMPTIONS

- Osteoarthritis is a common problem in the old age people.
- More the exercise done, more will be the improvement in performance of the activity.
- Degree of pain, symptoms and performance of activities vary from one person to another.

LIMITATIONS

- Sample size is small so the results cannot be generalized.
- Data on pain and symptom based on verbal report may not be a true reflection of what they experience.

DELIMITATIONS

The study is limited to

- Old age people from 55 to 75 years
- One old age home

SCOPE OF THE STUDY

The study will help to assess the difficulty in performing the activity, degree of pain, and symptoms of old age people with osteoarthritis .If there is a significant reduction of pain, symptoms and improvement in activities of daily living, it is a clear indication of the effectiveness of stretching exercises. These stretching exercises will be beneficial for the population who are not taking any treatment. It is a self initiative intervention and no cost is involved. The regular practice of these exercises will improve the ability of old age people to perform the activities of daily living like household activities, self care and minor outdoor activities etc.

CONCEPTUAL FRAMEWORK

Theoretical model for this study was derived from Callista Roy's Adaptation theory **(1996).** Roy employs a feedback cycle of input, throughput and output. Input is identified

as stimuli which can come from the environment or from within the person stimuli are classified as focal contextual and residual. Input also includes a person's adaptation level. Throughput makes use of a persons control processes and effectors. Processes refuse to control mechanism that a person uses as an adaptive system .Effectors refers to the physiological function, self concept and role function evolved in adaptation. Output is the outcome of the system. When the system is a person output refers to the behavior of the person. In Roy's system output is categorized as adaptive responses. These responses or output provide feedback for the system.

There are two types of coping mechanisms regulator and cognator. The regulator subsystem consists of input external process and output .Input stimuli may originate externally or internally in the person. The regulator subsystems control internal processes related to physiological needs.

Cognator subsystem consists of input, internal processes and output. Cognator control processes are related to the higher brain functions for perception of information processing, judgment and emotion.

The modified model in this study explains input as the focal stimuli namely joint pain, joint stiffness ,joint grinding and clicking sound ,decreased performance of activity, and the contextual stimuli are age , sex , education , years of joint pain ,number of affected knee joints. The coping mechanism of the cognator subsystem occurs as a result of stretching exercises. The experimental group is subjected to stretching exercises .The adaptive responses among the experimental group of old age people show reduction in the intensity of pain, symptoms and improved performance of activity. The control group that has not undergone the stretching exercises might not show an effective adaptation.

Figure – 1 highlights the conceptual framework based on modified Roy's adaptation model.

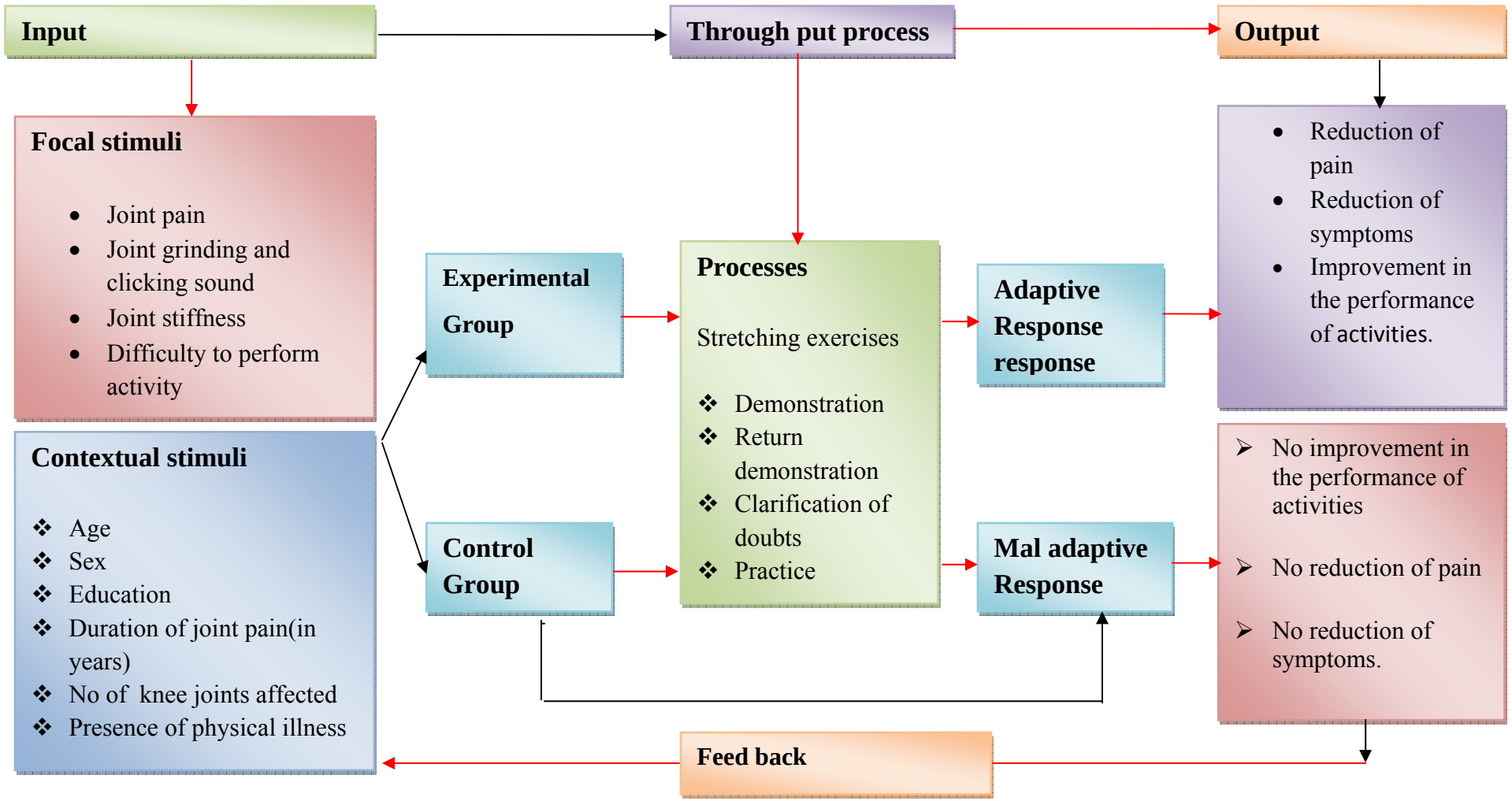

FIGURE – 1: CONCEPTUAL FRAMEWORK BASED ON MODIFIED ROYS ADAPTATION MODEL (1996)

REVIEW OF LITERATURE

CHAPTER -II

REVIEW OF LITERATUE

A literature review is a critical summary and an assessment of the current state of knowledge or current state of the art in a particular field. (**Dr Virginia Cano 1996).**

This chapter deals with the information collected in relation to present study through published and unpublished materials, which provided the foundation to carry out the study.

In the present study the review of literature is organized and presented as follows.

1. **Literature related to knee osteoarthritis in old age people.**
2. **Literature related to quality of life in old age people with knee osteoarthritis.**
3. **Literature related to pharmacological management of knee osteoarthritis.**
4. **Literature related to non pharmacological management of knee osteoarthritis.**

1. Literature related to osteoarthritis in old age people.

B.,Bagge,E.,Bjelle,A.,Eden,S.,Svanborg,A.ritish(2001) MedicalAssociationAnnals of the Rheumatic Diseases in the elderly conducted a study about the prevalence of osteoarthritis in old age people. Clinical and radiological findings showed 79 and 85 year old people with osteoarthritis. However, most studies of the disease had assessed patients under 70 years, and the course of osteoarthritis in patients older than 70 was not clear. Groups consisting of 76 to 266 elderly subjects, aged 79 and 85 years, were interviewed and medically examined, radio graphically (X-ray) examined, or medically and radio graphically examined during several time periods. The prevalence of joint complaints was similar in both age groups, but women tended to have significantly more complaints from wrist, hand, and knee joints than did men. Both age groups had a similar prevalence of medical signs of the disease, while women generally had significantly more signs.

Bukowsk. E .L (2004) University of Punjab conducted a study to determine the average age group for osteoarthritis. In this study participants were 200 patients attending the orthopedic outpatient department of the Punjab university health centre. Demographic analysis of this study revealed that, out of 200 patients 84 percentage of patients were in the age group of 40-70 years with the complaints of knee joint pain.

2. Literature related to quality of life in old age people with knee osteoarthritis.

Jakobsson U, Hallberg IR. J Clin Nurs.(2002) Lund University in Sweden conducted a study on pain and quality of life and the relationship between these variables among people aged 75 years and above with rheumatoid arthritis and/or osteoarthritis. Pain was common in both groups and was found to increase with age and disease duration among those with rheumatoid arthritis but not among those with osteoarthritis. Increased pain could lead to depression. Pain, functional limitation and increased age were found to decrease quality of life among those with rheumatoid arthritis and osteoarthritis alike. Social support was found to buffer against negative effects on quality of life among those with osteoarthritis while no moderating effects were found in rheumatoid arthritis. Increased age was found to relate to pain and decrease quality of life (both rheumatoid arthritis and osteoarthritis). It also seems justified to say that nursing care should especially focus on older people and that these people should be assessed for their level of pain, functional limitations and quality of life especially in the case of having rheumatoid arthritis and/or osteoarthritis.

Jill E Abell1, (2005) Medical University of South Carolina, conducted a study to assess the association between physical activity and health related quality of life (HRQOL) among persons with arthritis or chronic joint symptoms (CJS) sectional survey investigating the relation between physical activity level and health related quality of life. Health related quality of life was estimated using the number of physically or mentally unhealthy days during the past 30 days. Physical activity was categorized as recommended, insufficient, or inactive according to federal activity recommendations. Persons with arthritis were defined as those with either self reported chronic joint symptoms or doctor diagnosed arthritis. Among people with arthritis, recommended levels

of physical activity were associated with fewer mean physically and mentally unhealthy days and a decreased probability of having severely impaired physical or mental health related quality of life.

Norimatsu T (2011) Department of Orthopedic Surgery, Nagasaki University, conducted a population-based, longitudinal study on predicting health-related quality of life in knee osteoarthritis among community-dwelling women in Japan. Study included 333 women aged 50 years and older at baseline, with 8 to 9 years of follow-up. Anterio posterior weight-bearing knee radiographs were obtained at baseline and graded according to the Kellgren-Lawrence criteria. Definite osteoarthritis was defined as Kellgren-Lawrence grade 2 or higher in at least 1 joint. At baseline, all participants were asked if they had knee pain and comorbidities (heart disease, lung disease, stroke, or diabetes mellitus). Height (m), weight (kg), and chair stand time were measured. At follow-up, quality of life in knee osteoarthritis was evaluated using the Japanese Knee Osteoarthritis Measure score. Multiple linear regression analysis showed that age, knee osteoarthritis, knee pain, comorbidity, and increasing chair stand time were independently related to subsequent health-related quality of life. These findings suggest that treating knee osteoarthritis and comorbidities, managing pain, and optimizing lower extremity muscle strength may be effective targets for intervention.

3. Literature related to pharmacological management of knee osteoarthritis (OA

Lane ne et al (2008) Department of Medicine, University of California conducted a study on the use of the drug Tanezumab for the reduction of joint pain and improvement in function. In this study they randomly assigned 450 patients with osteoarthritis of the knee to receive tanezumab (administered at a dose of 10, 25, 50, 100, or 200μg per kilogram of body weight) .The primary efficacy measures were knee pain while walking and the patient's global assessment of response to therapy. They also assessed pain, stiffness, and physical function using the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).Results shows that there was a greater improvement in function and reduction of pain in patient with osteoarthritis.

Cisár P (2008) conducted a study on effectiveness of pine bark extract (Pycnogenol) on symptoms of knee osteoarthritis.100 patients were treated for 3 months either by 150 mg Pycnogenol per day at meals or by placebo. Patients had to report any change or use of previously prescribed anti-inflammatory medication during the study period. Patients filled the Western Ontario and Mc Masters University (WOMAC) questionnaire for osteoarthritis every 2 weeks and evaluated weekly pain symptoms using a visual analogue scale for pain intensity. Following treatment with Pycnogenol, patients reported an improvement of WOMAC index ($p < 0.05$), and a significant alleviation of pain by visual analogue scale ($p < 0.04$), the placebo had no effect.

Daniel O (2006) conducted a study to assess the effectiveness of Glucosamine and chondroitin sulfate for the treatment of the knee osteoarthritis. Double-blind, placebo- and celecoxib-controlled Glucosamine/chondroitin Arthritis Intervention Trial (GAIT) evaluated their efficacy and safety in the treatment of knee pain in osteoarthritis. 1583 patients with symptomatic knee osteoarthritis were randomly selected and given 1500 mg of glucosamine daily, 1200 mg of chondroitin sulfate daily, both glucosamine and chondroitin sulfate, 200 mg of celecoxib daily, or placebo for 24 weeks. Up to 4000 mg of acetaminophen daily was allowed as rescue analgesia. Assignment was stratified according to the severity of knee pain (mild [N=1229] vs. moderate to severe [N=354]). The primary outcome measure showed 20 percent decrease in knee pain from baseline to week 24.Outcome of the result was that combination of both the groups provides better effect than the results of each separately.

Sugimoto hauro et al (2006) Central Japan Journal of Orthopaedic Surgery & Traumatology Japan conducted a study to assess the effectiveness of hyaluronic-acid (HA) injection for reducing the pain-related symptoms in knee osteoarthritis in the elderly patients .He investigated the efficacy of hyaluronic-acid injection in the patients with the average age of 76.6 years old. HA (MW 800,000) per week was given to 43 patients for 9 weeks. The patients were grouped into 2 groups: a group of patients younger than 80 years old (22 patients) and a group of patients older than 80 years old (21 patients). The outcome of treatment was that as for pain, HA was effective in reducing pain in patients of 80 years old or older.

Fioravanti A et al (2009) spa center of Rapolano Terme (Siena, Italy) conducted a prospective, randomized, single-blinded, controlled trial to assess both the short- and long-term effectiveness of spa therapy in patients with primary knee osteoarthritis. Eighty outpatients were enrolled in this study; 40 patients were treated with a combination of daily local mud packs and bicarbonate-sulfate mineral bath water for 2 wks, and 40 patients continued regular, routine ambulatory care. Patients were assessed after 2 wks; after 3, 6, and 9 after the beginning of the study and were evaluated by Visual Analog Scale ,for spontaneous pain, The results confirmed that the beneficial effects of spa therapy in patients with knee osteoarthritis lasts over time, with positive effects on the painful symptomatology and a significant improvement on functional capacities.

Frestedt et al (2008) conducted a randomized controlled pilot trial with 70subjects with moderate to severe osteoarthritis of the knee .They were randomized to four double blinded treatment for 12 weeks. It included a) glucosamine (1500mg), b) aquamine (2400mg) c) combined treatment composed of (glucosamine sulphate and aquamine) and d) placebo. The outcome of this study showed that the multi mineral supplement (Aquamin) may reduce the pain and stiffness of osteoarthritis of the knee over 12 weeks of treatment and warrants further study.

Andereya S et al (2008) conducted a randomized study for assessment of leech therapy for knee osteoarthritis. 113 patients with advanced osteoarthritis of the knee were selected. The patients were randomized to a single treatment group, group I (single leech application, n = 38), a double treatment group, group II (double application, n = 35), and a control group (n = 40). The second treatment in group II took place after an interval of 4 weeks. The treatment in the control group was simulated with the help of an "artificial leech". These improvements were statistically significant for treatment groups I and II during the complete follow-up period. The reduction in individual requirements for pain medication was also statistically significant. The greatest improvement was seen in the group treated twice with the leeches, with a long-term reduction of joint stiffness and improved function in the activities of daily living.

Fioravanti A, Marcussen K C (**2001**) Florida, USA conducted a study to evaluate the efficacy and safety of a standardized and highly concentrated extract of 2 ginger species, (Zingiber officinale and Alpinia galanga), in patients with osteoarthritis of the knee. Two hundred sixty-one patients with OA of the knee and moderate-to-severe pain were enrolled in a randomized, double-blind, placebo-controlled, multicenter, parallel-group, 6-week study. After washout, patients received ginger extract or placebo twice daily, with acetaminophen. In the 247 evaluable patients, the percentage of responders experiencing a reduction in knee pain on standing was superior in the ginger extract group compared with the control group. Analysis of the secondary efficacy variables revealed a consistently greater response in the ginger extract group compared with the control group, when analyzing mean values: reduction in knee pain on standing reduction in knee pain after walking 50 feet, and reduction in the Western Ontario and McMaster Universities osteoarthritis composite index. A highly purified and standardized ginger extract had a statistically significant effect on reducing symptoms of OA of the knee.

Yip YB (2010) conducted an experimental study in Community Centre for Senior Citizens Hong Kong on the effectiveness of massage with aromatic ginger and orange essential oil for moderate-to-severe knee pain among the elderly. Fifty-nine older persons were enrolled in a double-blind, placebo-controlled. The intervention was six massage sessions with ginger and orange oil over a 3-week period. The placebo control group received the same massage intervention with olive oil only and the control group received no massage. Assessment was done at baseline, post 1-week and post 4 weeks after treatment there were significant mean changes between the three time-points within the intervention group on three of the outcome measures: knee pain intensity, stiffness level, and enhancing physical function but these were not apparent with the between-groups comparison 4 weeks after the massage. The improvement of physical function and pain was superior in the intervention group compared to both the placebo and the control group at post 1-week time.

4 Literature related to non pharmacological management of knee osteoarthritis.

Zhang-xin-wei (2004) conducted a study on 78 patients with knee osteoarthritis to investigate the effect of electro acupuncture on 4 acupoints in the knee. The 4acu points around knee are (Dubi, neixiyan, liangqiss and xuehai) connected with electrotherapy equipment. 78 patients were in the experimental group and 70 patients were in the control group. After 2 weeks of treatment, the result was 26 cases were cured clinically and 18 cases had remarkable effectiveness 13 cases improved and 3 cases failed with the total effective rate of 96.2%.And there was no change in the control group.

Itohet al (2008) Department of Clinical Acupuncture an Moxibustion, Meiji University, Kyoto Japan conducted a study to test a combined treatment of acupuncture and transcutaneous electrical nerve stimulation (TENS) is more effective than acupuncture or TENS alone for treating knee osteoarthritis (OA). Thirty-two patients with knee OA were randomly allocated to four groups. The acupuncture group received only acupuncture treatment at selected acupoints for knee pain; the TENS group received only TENS treatment at pain areas; the acupuncture and TENS group received both acupuncture and TENS treatments; the control group received topical poultice. Each group received specific weekly treatment five times during the study. It was found that combined acupuncture and TENS was effective in pain relief and knee function improvement for the sampled patients suffering from knee osteoarthritis.

Anbi et al (2004) American College of Rheumatology conducted a study to assess the feasibility and safety of using the health-promoting traditional Chinese exercise, known as Baduanjin, in treating knee osteoarthritis. 28 female patients who met the criteria for osteoarthritis of the knee were randomized into the Baduanjin group (n=14) and the control group (n=14). 11 patients in the Baduanjin group and 10 patients in the control group completed the trial. The Baduanjin group patients exercised 30-minute classes five times a week for 8 weeks, whereas the control group received no treatment. Compared with the control group, the participants in the Baduanjin group had statistically significant improvements in percentage changes of the WOMAC pain subscale, the stiffness subscale, the physical function subscale. This study suggested that the Baduanjin exercise provided a safe and feasible treatment option for patients with

knee OA, as well as offered reductions in pain, stiffness, and disability, which helped to improve the patients' quadriceps strength and aerobic ability.

Lund H (2008) conducted a randomized controlled trial of aquatic and land-based exercise in patients with knee osteoarthritis to compare the efficacy of aquatic exercise and a land-based exercise programme vs control in patients with knee osteoarthritis. Primary outcome was change in pain. Knee Injury and Osteoarthritis Outcome Score questionnaire (KOOS) was used to measure the pain. Standing balance and strength was also measured after and at 3-month follow-up. Seventy-nine patients (62 women), with a mean age of 68 years (age range 40-89 years) were randomized to aquatic exercise (n = 27), land-based exercise (n = 25) or control (n = 27). No effect was observed immediately after exercise cessation (8 weeks). At 3-month follow-up reduction in pain was observed only in the land-based exercise group compared with control.

Henry Pollard(1991) Department of Health and Chiropractic, Macquarie University conducted a study to determine the manual therapy technique that reduce the pain experienced by a group of chronic knee osteoarthritis sufferers in a randomized controlled trial. 43 participants with a chronic, non-progressive history of osteoarthritis knee pain, aged between 47 and 70 years were randomly allocated to an intervention group (n=26; or a control group(n=17; knee pain intensity measured on a visual analogue scale. The intervention consisted of the Macquarie Injury Management Group Knee Protocol whilst the control involved a non-forceful manual contact to the knee followed by interferential therapy set at zero. Participants received three treatments per week for two consecutive weeks with a follow up immediately after the final treatment. Post-treatment participants completed 11 questions including present knee pain intensity and feedback regarding their response to treatment utilizing a visual analogue scale. Following treatment, the intervention group reported a significant decrease in the present pain severity (mean 1.9) when compared to the control group.

Carol L (2008) Apr Department of Pathology, School of Medicine conducted a study on the Effectiveness of Tai Chi on gait kinematics, physical function, and pain in elderly with knee osteoarthritis--it has demonstrated that 6 weeks of Tai Chi exercise

significantly improved knee pain and stiffness in elderly with knee osteoarthritis. This study also examines the effects of Tai Chi exercise on gait kinematics, physical function, pain, and pain self-efficacy in elderly with knee osteoarthritis. In this prospective, pretest-posttest clinical trial, 40men and women diagnosed with knee osteoarthritis participated. 6 weeks of Tai Chi training given for these peoples as 1 hour/session, 2 session's week. The following measures were taken at baseline and at the conclusion of the intervention. gait kinematics including stride length, stride frequency In conclusion, these findings support that Tai Chi is beneficial for gait kinematics in elderly with knee osteoarthritis, and a longer term application is needed to substantiate the effect of Tai Chi as an alternative exercise in management of knee osteoarthritis.

Kawamura kenji et al (2003) In Japan, a study was conducted to assess the muscle strength of older subjects during both open kinetic chain (OKC) and closed kinetic chain (CKC) conditions to propose a simple and safe closed kinetic chain exercise method for knee osteoarthritis patients. Twelve healthy young male subjects and twelve older male subjects were tested. A quadriceps dynamometer with a load cell was used to measure pressing force and force direction in the sagittal plane. Classical OKC knee extension and flexion forces were also measured. Pressing force was directed from the hip joint to the center of the foot in younger subjects and from a point between the hip and knee joint to the center of the foot in older subjects. The quadriceps femoris muscles were active mainly in younger subjects. Both the quadriceps femoris muscles and hamstring muscles were active in older subjects. The author concluded that the leg press is safe for knee osteoarthritis patients. Based on this result, leg presses in a bathtub were suggested as a home exercise for knee osteoarthritis patients, for CKC.

Jorge et al (2001) conducted a study to assess pain, function, quality of life, walking endurance and muscular strength in women with knee osteoarthritis who participated in a progressive resistance exercise program (PREP). Eligible patients included women of age 40–70 years old with pain between 3 and 8 on a 10-cm pain scale of the 144 patients screened, and were randomized to the Experimental Group or Control Group. Patients in experimental group participated in a 12-week progressive resistance exercise programme twice a week and control group remained on a waiting list for

physiotherapy. The PREP consisted of strengthening exercises for knee extensors, knee flexors, hip abductors and hip adductors, all performed with 50% and 70% of the maximum amount of weight that can be tolerated for a given exercise (1 repetition maximum-1RM) using machines with free weights. The resistance was reevaluated every 2 weeks. Assessment for pain, muscle strength, walking endurance, function (WOMAC) and quality of life were done at baseline, 6 weeks and 12 weeks by a blinded assessor. A progressive resistance exercise program was effective in reducing pain and improving function and some domains of quality of life and strength in women with knee osteoarthritis at 6 weeks and 12 weeks after the intervention.

Osamu Aoki (2008) conducted a study to assess the effects of home-based knee stretching exercises on knee range of motion and Gait in Patients with Knee Osteoarthritis and gait speed in patients with knee osteoarthritis awaiting total knee arthroplasty. Thirty-six patients with severe knee osteoarthritis were randomly allocated to stretching (n=17) and control (n=19) groups. The subjects in the stretching group were instructed to perform home-based knee stretching exercises once a day for about 80 days, whereas the subjects in the control group were told to maintain their current level of physical activity. Outcomes assessed percentage changes in the total range of knee range of motion in the supine position, pain, gait speed and knee range of motion during gait. The stretching group showed significantly greater improvement in supine position range of motion(S-ROM), gait speed and gait speed of range of motion(G-ROM) than the control group (control vs. stretching Pain was significantly decreased in the stretching group compared to the control group.

Lucie Brosseau et al (2004) conducted a study to examine the efficacy of aerobic exercise among individuals with osteoarthritis to decrease pain and improve functional status. The purpose of this meta-analysis was to Twelve trials were included with 1363 patients undergoing various forms and combinations of aerobic physical activities including walking programmes, aquatic exercises, jogging in water, yoga and T'ai Chi. The overall results of this analysis indicate that various forms of aerobic exercise, such as a walking programme, jogging in water, yoga and T'ai Chi can have statistically significant effects on pain, joint tenderness, functional status, and respiratory capacity for

patients with osteoarthritis . Conclusions is the most efficacious exercise regimen has yet to be determined but aerobic exercise in general is more beneficial for the osteoarthritis patient.

CONCLUSION

This review of literature enlightened the investigator to develop an insight into the osteoarthritis problems of old age persons with osteoarthritis and benefits of stretching exercises. This review helped the investigator to gain a deeper knowledge of the research problem and to design the study.

METHODOLOGY

CHAPTER -III

METHODOLOGY

Methodology of research organizes all the components of the study in a way that is most likely to lead to valid answers to the sub problems that have been posed **(Burns and Grove, 2002).** It refers to various logical steps that are generally adopted by the investigator in studying the research problem.

This chapter explains the methodology adopted by the researcher to assess effectiveness of stretching exercises on pain, symptoms and performance of activities. It includes research design, setting, population, sample, and sampling technique, sampling criteria , description and construction of tool, pilot study , data collection procedure and data analysis.

RESEARCH APPROACH

The research approach is an overall plan chosen to carry out the study. The selection of research approach is the basic procedure for the conduct of research inquiry. An evaluative approach was used in this study as the study aimed at assessing the effectiveness of stretching exercises on pain, symptoms and performance of activities of old age people with osteoarthritis.

RESEARCH DESIGN

A non equivalent quasi experimental pretest –post test control group design was used to test the effectiveness of stretching exercises on pain ,symptoms and performance of activities of old age people

Experimental group	**30 DAYS** **O1 XXXXXXXXXXXXXXXXXXXXXXXXXXXXXX O2**
Control group	**O1** ⟶ **O2**

O1 –Pre assessment (using modified KOOS rating scale) of joint pain, symptoms and performance of activities for both experimental and control group.

O2 -- Post assessment of joint pain, symptoms and performance of activities after 30 days of exercise for experimental group and without exercise for the control group.

X -- Stretching exercises

VARIABLES OF THE STUDY

DEPENDENT VARIABLES: Joint pain, Symptoms and Performance of activity.

INDEPENDENT VARIABLES: Stretching Exercises (calf muscle stretch and quad muscle stretch.

SETTING OF THE STUDY

"Setting" refers to the area where the study is conducted. The setting for the study was a selected old age home at Erode. Total population of the old age home was 120. It is managed by sisters of little sisters of the poor exclusively for aged and destitute. The criterion for the admission in old age home is aged and destitute above 55 years. It is a service oriented home and no fee for stay and food is charged. A medical team includes (1 general physician and 2 nurses) visits the home once in a month and provides medical service to the people. There are two separate blocks in old age home. In each block there are 16 rooms with attached bath rooms. 4 members are accommodated in one room .There are separate room for males and females. Other facilities are common dining hall, prayer hall and garden.

TARGET POPULATION

The population under the study was all the males and females staying in the old age home and meeting the criteria for sample selection.

SAMPLE SIZE

Sample refers to a subset of population that is selected to participate in a particular study **(Burns and Grove 2002).**

In this study the sample size consisted of 40 inmates of the old age home (20 samples in control group and 20 in experimental group). Both males and females were included in this study.

SAMPLING TECHNIQUE

A list of eligible subjects was prepared. By purposive sampling technique, 20 samples were selected to the experimental group and 20 samples were selected to the control group.

SAMPLING CRITERIA

The following were the criteria for selection of samples for the study.

Inclusion criteria

- Old age people with joint pain aged between 55-75years.
- Old age people with osteoarthritis diagnosed.
- Bilateral or Unilateral joint pain.
- Those who were willing to participate in the study.

Exclusion criteria

- Those who were bed ridden, unable to sit alone and do exercise
- Old age people who had undergone any orthopedic surgery
- Un co-operative people

DESCRIPTION OF THE TOOL

The tool used in this study for the data collection was an interview schedule and the modified KOOS rating scale.

INTERVIEW SCHEDULE

The purpose of Interview schedule was to gather demographic data such as age, education, number of joints affected, duration of joint pain in years etc.

MODIFIED KOOS RATING SCALE (Appendix VI)

The KOOS scale is developed as an instrument to assess the patient's opinion about their knee and associated problems on a 5 point rating scale. KOOS consists of 5 subscales. Pain (9questions), other Symptoms (7questions), Function in daily living (17questions), Function in sport and recreation (5questions) and knee related Quality of life QOL (4questions). KOOS has been used in patients between 14-78 years old.

The KOOS scale was modified in order to collect data on pain, symptoms and performance of activities. It was organized under three headings .The tool is modified by removing the questions about function in sport and recreation (Sport/Rec) and knee related Quality of life (QOL) and by adding the questions regarding pain, knee stiffness and performance of activities which includes outdoor, house hold ,daily activities.

Pain - It consisted of a rating scale for assessing the pain while climbing the stairs, while bending and straightening the knee and while twisting the knee etc. It included 12 questions.

Symptoms - It consisted of a rating scale for assessing the symptoms seen in the patient like stiffness, knee clicking and grinding, etc .It included 8 questions.

Performance of activity - It consisted of a rating scale for measuring the difficulty in performing the activity while doing the activities like light household activities, outdoor activities, daily activities and light movements. It included 22 questions.

SCORING AND SCORING INTERPRETATION

1) Pain

SCORE	SCORING INTERPRETATION
0 - 16	Mild pain
17 - 32	Moderate pain
33 - 48	Severe pain

2) Symptoms

SCORE	SCORING INTERPRETATION
0 - 10	Mild symptoms
11 - 21	Moderate symptoms
22 - 32	Severe symptoms

3) Performance of activity

SCORE	SCORING INTERPRETATION
0 - 29	Mild difficulty
30 - 58	Moderate difficulty
59 - 88	Severe difficulty

DEVELOPMENT OF TEACHING PLAN ON STRETCHING EXERCISES (APPENDIX VII)

Stretching exercise

Stretching exercise is an exercise in which a specific skeletal muscle or muscle group is deliberately elongated to its fullest length in order to improve their muscle elasticity. The stretching exercises included are calf muscle stretch and quadriceps stretch.

♣ **Exercise in standing position**

Exercise no 1

Calf muscle stretch

- First warm up .For that, walk for 5 minutes in the room.
- Then Stand straight by facing a wall and keeping both legs together with your forearms up against the wall.
- Stand with one leg far in front of the other and lean forwards against a wall. i.e., first place the forward the right leg forward and Step back with the left leg.
- Keep the back heel flat on the floor
- Slowly bend the right knee and keep the back knee straight
- Bend right knee until you feel a gentle stretch in the left leg calf
- Hold the leg in 30 seconds in stretching position
- Slowly relax.
- Bring back both the legs in first position.
- Repeat the exercise again for 5 times in right leg.
- Then repeat with the steps in other leg.
- **Perform 5 repetitions, 1 time daily.**

Exercise no 2

Quad muscle stretch

- Walk for 5 minutes
- Stand straight and bend right knee

- Grab front of the right ankle and bring heel to buttocks with one hand as far as possible
- Support the other hand on the chair for balance
- Keep knees together.
- Point knee toward floor.
- Hold for 30 seconds
- bring back the leg on the same position
- Repeat the exercise again for 5 times in right leg.
- Then repeat the steps in other leg.
- Instructions to follow

STRUCTURED TEACHING PLAN

A teaching plan on stretching exercise was prepared

The following steps were adopted to develop the teaching plan

- Development of objectives based on the study objectives
- Selection of teaching learning contents
- Selection of teaching learning activities
- Selection of audiovisual aids
- Organization of the content

The contents included were:

- Symptoms of osteoarthritis
- Benefits of stretching exercise
- Demonstration of stretching exercise
- Practice and re demonstration

The first draft of teaching plan was developed by keeping in mind the objectives, literacy level of the sample, and simplicity of the language. The teaching plan was developed in English and translated into Tamil (appendix page Vii)

CONTENT VALIDITY OF THE TOOL

The tool along with the teaching plan and objectives, was submitted to two medical experts ,two nursing experts, and one physiotherapist .Both the nursing experts were Professors with Masters Degree in Nursing and working in different colleges of nursing in Coimbatore with more than 5 years of experience. The medical expert MD (orthopedic) is a chief consultant in one of the private hospitals in Coimbatore with more than 20 years of experience. Physiotherapist is the chief consultant in one of the private hospitals.

RELIABILITY OF THE TOOL

The reliability of the modified KOOS rating scale was established by test retest method.10 samples was selected. 5 in experimental and 5 in control group.The re-test was given after 14 days. Correlation co-efficient was calculated by Spearman Brown correlation method. The obtained 'r' value was 0.83 which confirmed that there was high positive correlation and internal consistency of the tool.

PILOT STUDY

A pilot study was conducted in the same old age home, where main study was intended to be carried out, to test the feasibility of study. Permission was obtained from the concerned authorities of the Old age home.

The pilot study was carried out from 22 – 8 – 2011 to 7 – 9 – 2011 over a period of 14 days. 10 samples were selected, 5 in experimental and 5 in control group. Both males and females were included in this study. The experimental and control group were selected by using purposive sampling technique .After self introduction, the investigator explained the nature of study to the samples. After developing good rapport, the investigator collected the baseline data on joint pain, symptoms and performance of activities of the each samples for the past one month by interviewing the samples individually.

Stretching exercise in standing position was taught and demonstrated to the 5 samples of the experimental group as a group teaching and they were asked to re-

demonstrate. On the 15th day the investigator conducted the post test using same tool.. Pilot study confirmed the adequacy of the tool and technique. Hence no modifications were required. The stretching exercises were also taught to the control group after the post test was over for their benefit.

DATACOLLECTION METHOD

The main study was done from 8 – 9 – 2011 to 8 – 10 – 2011. The study was conducted in the same old age home where the pilot study was conducted. Before the data collection, permission was obtained from the old age home authority. A hall was arranged for demonstrating the exercise. Based on the sampling criteria and technique 20 samples were selected for experimental group and the same numbers of samples were selected for control group. After establishing good rapport and obtaining their willingness, the data were collected from both the groups by interview method using modified KOOS rating scale.

The next day the investigator stayed in the old age home from 9am – 1 pm. The experimental group was divided into two subgroups, male and female separately. According to teaching plan relaxation therapy was taught and demonstrated separately for male and female in 2 sessions. The old age people were asked to re-demonstrate and carryout the exercises 15 minutes a day for 30 days in the presence of investigator. For control group no intervention was given. In both groups, on 30th day the investigator conducted the post test by using the same tool.

PLAN FOR DATA ANALYSIS

The data obtained would be analyzed in terms of the objectives of the study using descriptive and inferential statistics.

Descriptive statistics

Frequency and percentage distribution are used to analyze demographic variables, to assess the degree of joint pain, symptoms and performance of activity in the experimental and control group. Mean and standard deviation are used to determine the difference in degree of joint pain, symptoms and performance of activity.

Inferential statistics

Paired and unpaired ‘t’ test is used to determine the significant difference in degree of joint pain, symptoms and performance of activity between the experimental and control group. ($\chi 2$) test was used to associate the demographic variables with pain, symptoms and performance of activity.

ANALYSIS AND INTERPRETATION

CHAPTER -IV
ANALYSIS AND INTERPRETATION OF DATA

Data analysis is the systematic organization and synthesis of research data and the testing of research hypothesis using those data. Interpretation is the process of making sense of the results of a study and examining their implications". **Copper K L (2008)**

This chapter deals with the analysis and interpretation of data collected from 40 old age people with osteoarthritis. The data have been analyzed and presented under the following headings.

Section – 1 Demographic characteristics of the sample.

This section deals with the demographic profile of the old age people in relation to their age, sex, education, financial support, and joint pain related information in the experimental and control group in frequency and percentage.

Section – 2 Assessment of Joint pain in experimental and control group

Pain has been analyzed in three degrees mild, moderate and severe for the experimental and control group before and after intervention in frequency and percentage and comparison of degree of pain is done by mean score and its significance by statistical test.

Section – 3 Assessment of Joint symptoms in experimental and control group

Symptoms have been analyzed in three degrees (mild, moderate, and severe) for the experimental and control group before and after intervention in frequency and percentage and comparison of symptoms has been done by mean score and its significance by statistical test.

Section – 4 Assessment of performance of activity in experimental and control group

Performance of activities has been analyzed in three levels mild, moderate and severe in the experimental and control group before and after the intervention in frequency and percentage and comparison of performance of activities has been done by mean score and its significance by statistical test.

Section – 5 Association of selected demographic variables with overall symptoms before the intervention

This section presents the association of selected demographic variables with degree of symptoms in experimental and control group before the intervention.

1 DEMOGRAPHIC CHARACTERSTICS OF THE SAMPLE

TABLE NO -I

FREQUENCY AND PERCENTAGE DISTRIBUTION OF SAMPLES ACCORDING TO PERSONAL CHARACTERISTICS

N=40

SL .No	Demographic Characteristics	Experimental group N=20		Control group N=20	
		f	%	f	%
1.	Age				
	• 60-65yrs	13	65.0	10	50.0
	• 65-70yrs	07	35.0	10	50.0
	• 70-75yrs	00	-	-	-
2.	Sex				
	• Male	03	15.0	04	20.0
	• Female	17	85.0	16	80.0
3.	Education				
	• Illiterate	09	45.0	10	50.0
	• Primary	07	35.0	07	35.0
	• Secondary	04	20.0	03	15.0
4.	Financial support				
	• Pensioner	-	-	-	-
	• Charitable trust	20.0	100.00	20.0	20.0

Table-I presents frequency and percentage distribution of samples according to personal characteristics of the sample.

Age:

All the forty samples were above 60 years of age. Majority of the experimental group 13(65%) were between the age of 60 to 65years and 7 (35%) samples in the age group of 65 to 70 years. In the control group 10 samples (50%) were between 60 to 65 years and 10 between 65 to 70 years of age.

Sex

Majority of the samples in both the groups were females, about 17(85%) in experimental group, and 16 (80%) in control group. The rest were males in both the groups.

Education

In the experimental group, 9 (45%) samples were illiterate, 7 (35%) samples completed primary education, and 4 (20%) samples had secondary education, whereas in the control group 10(50%) samples were illiterates, 7 (35%) samples had primary, and 3 (15%) had secondary education.

Financial support

All the samples in both the experimental and control group were getting financial support from the charitable trust of their institution.

TABLE –II

FREQUENCY AND PERCENTAGE DISTRIBUTION OF SAMPLES ACCORDING TO JOINT PAIN RELATED INFORMATION

N=40

SL.NO	Characteristics	Experimental group N=20		Control group N=20	
		f	%	f	%
1	No of knees affected with joint pain				
	• One knee	13	65.00	10	50.00
	• Both the knees	07	35.00	10	50.00
2	Occurrence of joint pain				
	• All the time	05	25.00	07	35.0
	• During activities	15	75.00	13	65.0
3	Treatment for joint pain				
	• Yes	-	-	-	-
	• No	20	100	20	100.0
4	Years of joint pain				
	• 1yrs	02	10.0	04	20.0
	• 2yrs	04	20.0	04	20.0
	• 3yrs	04	20.0	05	25.0
	• >3yrs	10	50.0	07	30.0

Table-II presents frequency and percentage distribution of samples according to joint pain related information

Number of knee affected with joint pain

Majority of the sample 13 (65%) in experimental group were affected the joint pain in one knee and 7 (35%) samples affected with joint pain in both the knee. In the control group 50% of the samples had pain in one knee and the other half with pain in both the knees.

Occurrence of joint pain

In the experimental group 5 (25%) samples had joint pain all the time and 15(75%) samples had pain only during activities. In the control group 7 (35%) samples had pain all the time and 13 (65%) samples had pain during activities only.

Treatment of joint pain

In the experimental and control group nobody was taking any treatment for joint pain.

Duration of joint pain in years

In the experimental group 2-4 samples (10 to 20%) reported having joint pain for the past 1, 2 or 3 years.10 (50%) samples reported having pain for more than three years. In the control group 7 (30%) samples reported having joint pain for more than three years. The rest of the samples had joint pain either for 1 year (10%), 2 year (20%), or for 3 years (25%).

2 ASSESSMENT OF JOINT PAIN IN EXPERIMENTAL AND CONTROL GROUP

TABLE III

FREQUENCY AND PERCENTAGE DISTRIBUTION OF EXPERIMENTAL AND CONTROL GROUP ACCORDING TO DEGREE OF JOINT PAIN BEFORE AND AFTER INTERVENTION ON 30th DAY.

N =40

Sl.No	Degree of pain	Experimental group N=20				Control group N=20			
		Before Intervention		After Intervention		Baseline Observation		Subsequent Observation	
		f	%	f	%	f	%	f	%
1	Mild	-	-	18	90.00	-	-	-	-
2	Moderate	20	100.00	2	10.00	20	100.0	20	100.0
3	Severe	-	-	-	-	-	-	-	-

Table III – presents the distribution of experimental and control group in three degree of joint pain before and after intervention.

Before intervention, all the samples 20(100%) in the experimental group and in the control group had moderate joint pain.

After intervention, only 2 samples (10%) showed moderate pain and 18(90%) showed mild pain in the experimental group where as in the control group all the 20 samples (100%)continued to have moderate pain in the subsequent observation on the 30^{th} day just as reported at baseline observation.

The marked reduction of joint pain in the experimental group could be due to the stretching exercises given.

TABLE – IV

MEAN SCORE OF JOINTPAIN IN EXPERIMENTAL AND CONTROL GROUP BEFORE AND AFTER INTERVENTION AND LEVEL OF SIGNIFICANCE

N=40

Group	Max. Score	Before Intervention			After Intervention			MD	paired 't' value P<0.05 df-19
		Mean score	Mean %	SD	Mean score	Mean %	SD		
Experimental Group	48	21.55	44.89	2.96	15.30	31.87	2.71	6.25	10.952*
Control Group	48	22.70	47.29	1.97	22.95	47.8	3.03	0.25	0.533NS

*** Significant NS- not significant Table value- 1.729**

Table –IV presents the mean score of joint pain in experimental and control group before and after the intervention.

In the experimental group before intervention the mean score of pain was 21.55. After intervention, the mean score of pain was reduced to 15.30 whereas in the control group the mean score of pain was 22.70 in baseline observation and there was not much change observed in the subsequent observation.

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Statistically there was a significant difference in the mean score of pain in experimental group before and after the intervention ($t = 10.95^*$, $df = 19$, $P<0.05$) whereas no significant difference was found in the control group.

TABLE- V

COMPARISON OF MEAN PAIN SCORE BETWEEN EXPERIMENTAL AND CONTROL GROUP BEFORE AND AFTER INTERVENTION AND LEVEL OF SIGNIFICANCE

N=40

Observation	Max. Score	Experimental Group N = 20			Control Group N = 20			MD	Un paired 't' value P<0.05 df-38
		Mean score	Mean %	SD	Mean score	Mean %	SD		
Before intervention	48	21.55	44.89	2.96	22.70	47.29	1.97	1.15	1.44NS
After intervention	48	15.3	31.87	2.71	22.95	47.21	3.03	7.65	8.40*

***significant NS- not significant Table value-1.686**

Table –V presents the mean score of pain in experimental and control group before and after the intervention.

Before the intervention the mean score of pain was 21.55 in the experimental group and 22.70 in the control group.

After the intervention the mean score of pain was 15.3 in the experimental group and 22.95 in control group.

The table concludes that the mean pain score in experimental group and control group before intervention showed no marked difference whereas after the intervention the mean pain score showed a marked difference in joint pain.

Statistically there was a significant difference in the mean score of pain in the experimental and control group after the intervention (t =8.40*, df -38, p=0.05) and no significant difference before the intervention.

So the hypothesis (H1) There is a significant difference between the mean score of pain in experimental and control group after the intervention is accepted.

Figure 2: presents the percentage of experimental and control group according to mean pain score before and after the intervention.

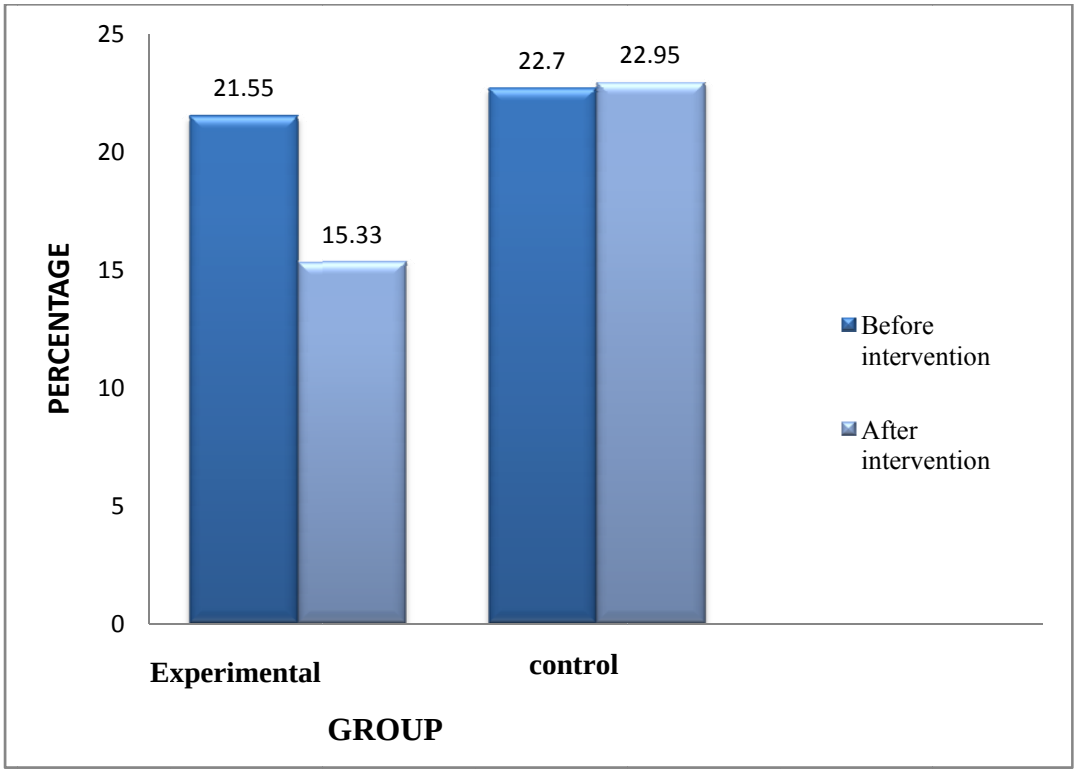

Figure 2: percentage of experimental and control group according to mean pain score before and after the intervention.

3.ASSESSMENT OF JOINT SYMPTOMS IN EXPERIMENTAL AND CONTROL GROUP

TABLE VI

FREQUENCY AND PERCENTAGE DISTRIBUTION OF EXPERIMENTAL GROUP ACCORDINDG TO DEGREE OF JOINT SYMPTOMS BEFORE AND AFTER INTERVENTION

N=20

SL NO	Joint symptoms	Experimental group N=20											
		Before Intervention						After Intervention					
		mild		moderate		severe		mild		moderate		severe	
		f	%	f	%	f	%	f	%	f	%	f	%
1	Knee Stiffness	13	65.00	7	35.00	-	-	20	100.00			-	-
2	Knee grinding & Clicking	19	95.00	01	05.00	-	-	19	95.00	01	05.00	-	-
3	Knee movements	18	90.00	2	10.00	-	-	18	90.00	02	10.00	-	-

Table VI Shows frequency and percentage distribution of the experimental group according to degree of joint symptoms before and after intervention.

In the experimental group, before the intervention, 13 (65%) of the samples had mild and 7 (35%) had moderate degree of knee stiffness. After the intervention all the samples 20(100%) had only mild knee stiffness.

In the experimental group only 1-2 sample had moderate degree of knee grinding and clicking and the rest (90-95%) of the sample had mild degree of knee grinding and knee movements before intervention. These two symptoms remained at the same level after the intervention.

The table concludes that there was a marked reduction in the knee stiffness after the intervention but no change was observed in knee grinding and knee movements.

TABLE VII

FREQUENCY AND PERCENTAGE DISTRIBUTION OF CONTROL GROUP ACCORDING TO DEGREE OF JOINT SYMPTOMS BEFORE AND AFTER INTERVENTION

N=20

Sl.No.	Joint symptoms	Control group							
		Baseline observation				Subsequent observation			
		Mild symptoms		Moderate symptoms		Mild symptoms		Moderate symptoms	
		f	%	f	%	f	%	f	%
1	Knee stiffness	13	65.00	7	35.00	15	75.00	05	25.00
2	Knee grinding & clicking	20	100.00	-	-	20	100.00	-	-
3	Knee movements	20	100.00	-	--	20	100.00	-	-

Table – VII frequency and percentage distribution of the control group according to degree of joint symptoms before and after intervention.

In the control group in the baseline observation, 13 (65%) of the samples had mild knee stiffness 7 (35%) of the samples had moderate knee stiffness whereas in the subsequent observation 15 (65%) of the samples had mild stiffness and 5(25%) of the samples with moderate stiffness.

All the 20 samples had mild knee grinding and mild restriction in three movements. Subsequent observation on the 30th day showed no change.

This table concludes that there was no marked change in both the observation, in the control group.

TABLE – VIII

MEAN JOINT SYMPTOM SCORE OF EXPERIMENTAL GROUP ACCORDING TO INDIVIDUAL SYMPTOMS BEFORE AND AFTER INTERVENTION AND ITS LEVEL OF SIGNIFICANCE

N=20

Sl No.	Aspects of symptoms	Maximum score	Before Intervention			After Intervention			MD	paired 't' value P<0.05 df-19
			Mean	Mean %	SD	Mean	Mean %	SD		
1	Knee stiffness	16	8.95	55.93	1.98	6.65	41.56	1.38	2.30	7.45*
2	Knee clicking &grinding sound	08	0.45	5.62	1.23	0.20	2.50	0.52	0.25	0.89
3	Knee movements	08	0.60	7.50	1.56	0.25	3.12	0.63	0.35	1.67

***- Significant NS- not significant Table value-1.729**

Table –VIII Presents the mean joint symptoms score of experimental group before and after intervention and its level of significance

In the experimental group, there was marked difference found in the mean score of knee stiffness, before and after intervention. Before the intervention, the mean score of the symptoms 'knee stiffness' was 8.95 and mean score of knee clicking and grinding and knee movements were 0.45 and 0.60 respectively.

After the intervention the mean score for knee stiffness was 6.65 and mean score of knee clicking and grinding and knee movements were 0.20 and 0.25 respectively.

Statistically there was a significant difference in the mean score of the symptoms 'knee stiffness' after intervention. The obtained value was more than the table value ($t=7.45^*, df= 19, p<0.05$),($t=0.89, df= 19, p<.05$), ($t = 1.67^*, df = 19, P<0.05$).There was no significant difference in the symptoms of knee clicking and grinding sound and knee movements after the intervention.

So this table shows that there was a marked reduction of knee stiffness after the intervention.

TABLE –IX

MEAN JOINT SYMPTOM SCORE OF CONTROL GROUP ACCORDING TO INDIVIDUAL SYMPTOMS BASELINE AND SUBSEQUENT OBSERVATION AND ITS LEVEL OF SIGNIFICANCE

N=20

Sl No	Joint symptoms	Max. score	Baseline observation			Subsequent observation			MD	paired 't' value P<0.05 df-19
			Mean	Mean %	SD	Mean	Mean %	SD		
1	Knee stiffness	16	8.15	50.93	1.13	7.90	49.30	1.07	0.25	1.42NS
2	Knee clicking &grinding Sound	08	0.70	8.75	0.80	0.75	9.30	0.71	0.05	0.29NS
3	Knee movements	08	0.70	8.75	0.92	0.85	10.6	1.03	0.15	1.33NS

***- Significant NS- not significant Table value-1.729**

Table –IX presents the mean joint symptom score of control group according to individual symptoms at baseline and subsequent observation and its level of significance.

In the control group the baseline observation the mean score of knee stiffness was 8.15 and mean score of knee clicking and grinding and knee movements was 0.70.

In the subsequent observation the mean score of knee stiffness was 7.90 and mean score of knee clicking and knee grinding and knee movements were 0.75 and 0.85.respectively.

Statistically there were no significant difference in any of the three symptoms between baseline and subsequent observation.

TABLE X

COMPARISON OF MEAN SCORE OF JOINT SYMPTOMS IN EXPERIMENTAL AND CONTROL GROUP BEFORE AND AFTER INTERVENTION AND LEVEL OF SIGNIFICANCE

N=40

Intervention	Max. Score	Experimental Group N = 20			Control Group N = 20			MD	Unpaired 't' value P<0.05 df-38
		Mean	Mean %	SD	Mean	Mean %	SD		
Before	32	10.00	31.25	2.02	9.50	29.68	1.82	0.45	0.73NS
After	32	7.30	22.81	1.89	9.50	29.68	2.06	2.20	3.51*

*** Significant NS- not significant Table value 1.686**

Table- X presents the mean score of joint symptoms in experimental and control group before and after the intervention.

Before the intervention the mean score of joint symptoms was 10.00 and 9.50 in the experimental and control group respectively. After the intervention the mean score of symptom was 7.30 for the experimental group and there was no change in the control group.

The statistical test showed that there is a significant difference in the mean score of symptoms in experimental and control group after the intervention ($t = 3.51^*$, $df = 38$, $p<0.05$) and no significant difference before the intervention.

So the hypothesis (H2) – There is a significant difference between the mean score of symptoms of control and experimental group after the intervention is accepted

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Figure 3: presents the mean score of joint symptoms of experimental and control group before and after the intervention.

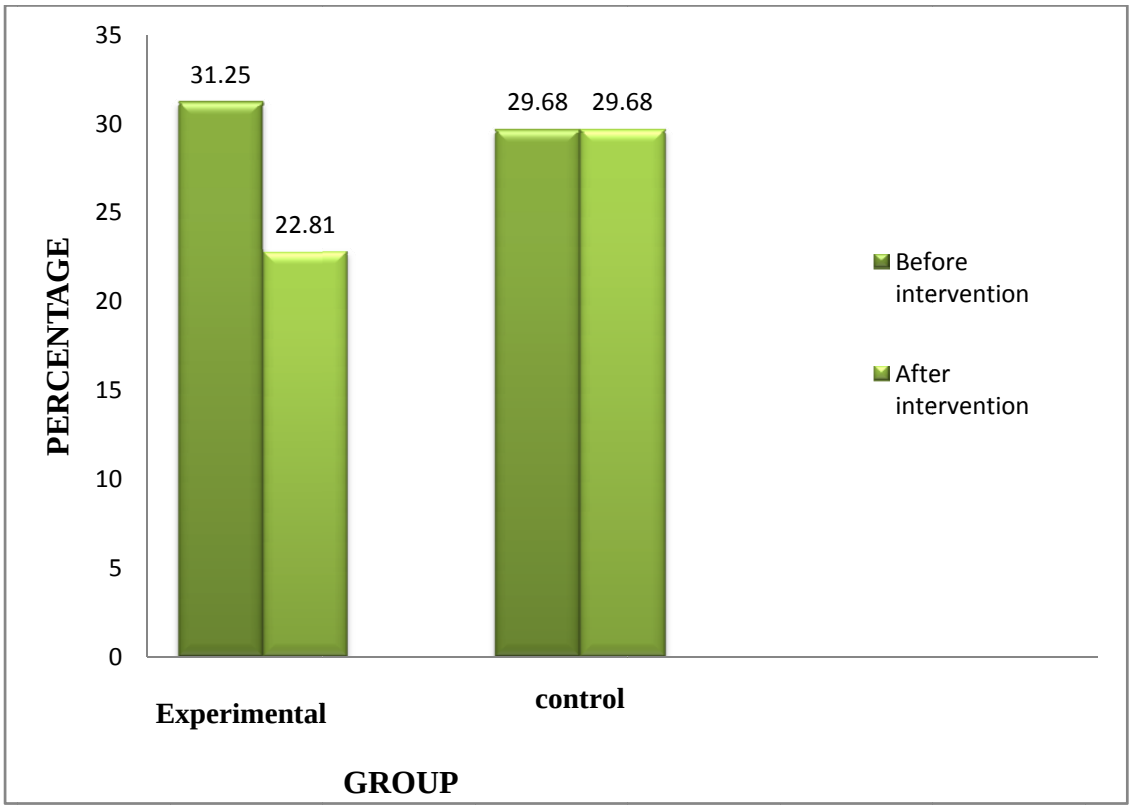

Figure (3) percentage of mean score of joint symptoms of experimental and control group before and after the intervention

4 ASSESSMENT OF PERFORMANCE OF ACTIVITY IN EXPERIMENTAL AND CONTROL GROUP

TABLE – XI

FREQUENCY AND PERCENTAGE DISTRIBUTION OF EXPERIMENTAL GROUP ACCORDING TO LEVEL OF PERFORMANCE OF ACTIVITES BEFORE AND AFTER INTERVENTION

N=20

Sl No.	Activities	Level of performance							
		Before intervention				After intervention			
		Mild difficulty		Moderate difficulty		Mild difficulty		Moderate difficulty	
		f	%	f	%	f	%	f	%
1	Household activities	01	5.00	19	95.00	16	80.00	4	20.00
2	Outdoor activities	01	5.00	19	95.00	16	80.00	4	20.00
3	Daily activities	10	50.0	10	50.00	20	100.00	_	_
4	Knee Movements	14	70.00	06	30.00	20	100.00	_	_

Table XI – presents the distribution of experimental group according to level of performance of different activities before and after intervention.

Before the intervention majority of the samples 19(95%) in experimental group had moderate difficulty in the performance of house hold and outdoor activities. Whereas after the intervention only 4(20%) of them had moderate difficulty

In daily activities, before intervention, half of the samples had mild difficulty and the rest had moderate difficulty whereas after intervention all the samples showed only mild difficulty. In knee movements, before intervention, 14(70%) of the samples had mild difficulty and 6(30%) of the samples had moderate difficulty in performing the activity whereas after intervention, all the samples showed only mild difficulty.

The significant reduction observed in the level of difficulty could be due to the efficacy of the intervention (Stretching exercises).

TABLE – XII

FREQUENCY AND PERCENTAGE DISTRIBUTION OF CONTROL GROUP ACCORDING TO LEVEL OF PERFORMANCE OF ACTIVITIES AT BASELINE AND SUBSEQUENT OBSERVATION

N=20

SL No	Activities	Control group							
		Baseline Observation				Subsequent Observation			
		Mild difficulty		Moderate difficulty		Mild difficulty		Moderate difficulty	
		f	%	f	%	f	%	f	%
1	Household activities	-	-	20	100.0	2	10.00	18	90.00
2	Outdoor activities	-	-	20	100.0	1	5.00	19	95.00
3	Daily activities	15	75.00	05	25.00	17	85.00	03	15.00
4	Knee Movements	13	65.00	07	35.00	15	75.00	05	25.00

Table XII – presents the distribution of control group according to level of performance of different activities baseline and subsequent observation.

There was only a marginal difference in the level of difficulty in the performance of activities observed in the control group in baseline and subsequent observation. At the baseline observation all the samples in the household and outdoor activities had moderate difficulty. At the subsequent observation the samples 2(10%) mild difficulty and 18(90%) showed moderate difficulty to perform the household

activities and 1(5%) sample had mild and 19(95%)samples had moderate difficulty in performing the outdoor activities.

In the baseline observation 15(75%) samples had mild and 5(25%) samples had moderate difficulty in performing the daily activities and 13(65%) samples had mild and 7(35%) samples had moderate difficulty in knee movement. The subsequent observation showed no significant difference in daily activities and movements. The samples 17(85%) showed mild and 3(15%) samples moderate difficulty and 15(75%) and 5(25%) had moderate difficulty respectively.

The table concludes that there was no difference in the level of performance of the activities in baseline and subsequent observation.

TABLE – XIII

MEAN PERFORMANCE SCORE OF EXPERIMENTAL GROUP IN DIFFERENT ACTIVITIES BEFORE AND AFTER INTERVENTION AND LEVEL OF SIGNIFICANCE

N=20

Sl No	Activities	Max. score	Before Intervention			After Intervention			MD	paired 't' value P<0.05 df-19
			Mean	Mean %	SD	Mean	Mean %	SD		
1	Household activities	12	5.80	48.33	0.89	4.15	34.58	0.81	1.65	11.00*
2	Outdoor activities	12	5.75	47.91	0.91	4.10	34.16	0.55	1.65	7.90*
3	Daily activities	32	10.55	32.96	1.14	8.15	25.46	1.30	2.40	9.39*
4	Movements	32	9.90	30.93	9.90	7.85	24.53	7.85	2.05	8.73*

*** Significant** **Table value 1.729**

Table –XIII presents the mean performance score in experimental group in different activities before and after the intervention.

In the experimental group before intervention the mean score of performance of household activities was 48.33, outdoor activities was 47.91, Daily activities was 32.96, and knee movements was 30.93 whereas after the intervention the level of difficulty for performing activities was reduced to 34.58 for household activities, 34.16 for outdoor activities, 25.4 for daily activities and 24.53 for knee movements.

The obtained values are more than the table value(t=11.0* df=19p<0.05) for householdactivities,(t=7.90*,df=19,p<0.05) for outdoor activities,(t=9.39*,df=19,p<0.05) for daily activities, and for knee movements, (t=8.73*, df=19,p<0.05).

The table concludes that there was a significant improvement in level of performance of activities after the intervention.

TABLE – XIV

MEAN PERFORMANCE SCORE OF CONTROL GROUP IN DIFFERENT ACTIVITIES AT BASELINE AND SUBSEQUENT OBSERVATION AND LEVEL OF SIGNIFICANCE

N=20

Sl No	Activities	Max score	Baseline observation			Subsequent observation			MD	paired 't' value P<0.05 df-19
			Mean	Mean %	SD	Mean	Mean %	SD		
1	Household activities	12	5.90	49.16	0.78	5.75	47.91	0.96	0.15	1.37NS
2	Outdoor activities	12	5.75	47.91	0.71	5.55	46.25	0.82	0.20	1.71NS
3	Daily activities	32	10.15	31.71	0.87	9.95	31.09	0.75	0.20	1.45NS
4	Movements	32	10.10	31.56	0.91	10.00	31.25	0.85	0.10	1.45NS

NS- not significant **Table value-1.72**

Table –XIIII presents the mean performance score in control group in different activities at baseline and subsequent observation.

At baseline observation the mean score of performance of activity of household activities was 49.16 outdoor activities 47.91, daily activities 31.71, and movements 31.56. Whereas no significant difference in the performance of activities in the subsequent observation 47.91 for household activities, 46.25 for outdoor activities 31.09 daily activities, 31.25 for knee movements respectively. Statistically there was no significant difference in any of the activities in the baseline and subsequent observation.

TABLE XV

COMPARISON OF OVERALL MEAN PERFORMANCE SCORE OF EXPERIMENTAL AND CONTROL GROUP BEFORE AND AFTER INTERVENTION AND LEVEL OF SIGNIFICANCE

N=40

Observation	Max. Score	Experimental Group N = 20			Control Group N = 20			MD	Un paired 't' value P<0.05 df-38
		Mean	Mean %	SD	Mean	Mean %	SD		
Before intervention	88	32.05	36.42	0.68	31.75	36.07	0.63	0.30	1.431NS
After intervention	88	24.30	27.61	2.34	31.65	35.96	1.22	7.35	12.43*

***significant NS- not significant df –degree of freedom Table value-1.686**

Table –xv presents overall mean performance score of experimental and control group before and after intervention

The data shows that the overall mean performance score of experimental group was higher (32.05) than the control group (31.75) before intervention. However statistically there is no significant difference between the mean score of performance of activity in experimental and control group before intervention (t =1.43at df -38, p = 0.05)

The Mean performance score of experimental group was lesser (27.61) than the mean score of control group (31.65) after intervention. Statistically there was a significant difference between the mean score of performance of activity in experimental and control group after intervention (t=12.43*, df -38, p=0.05).

So the hypothesis (H3) there is a significant difference between the performance of activity in experimental and control group after intervention is accepted.

Figure 4: percentage of experimental and control group according to mean score of performance of activity before and after the intervention.

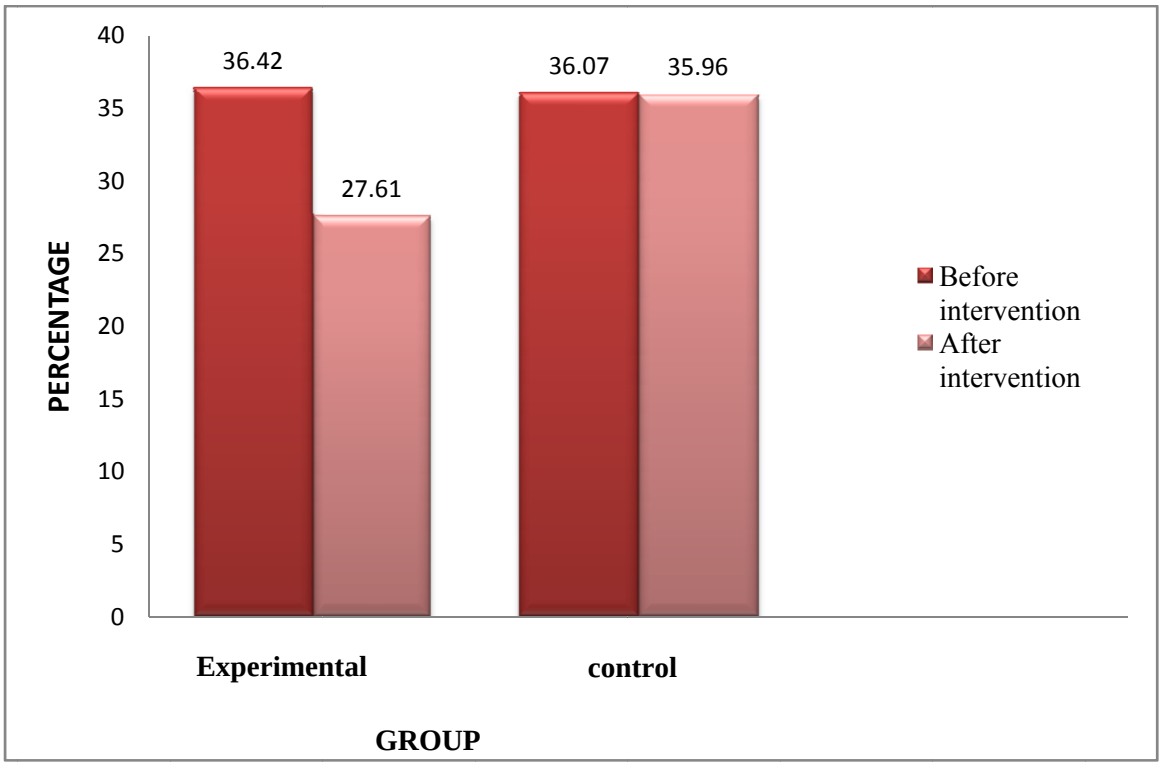

Figure (4): Percentage of mean performance score of experimental and control group before and after the intervention.

5. ASSOCIATION OF DEMOGRAPHIC VARIABLES WITH STUDY VARIABLES

TABLE XVI

ASSOCIATION OF DEMOGRAPHIC VARIABLES WITH DEGREE OF SYMPTOMS OF TOTAL SAMPLES BEFORE THE INTERVENTION

N=40

Sl No	Characteristics	Mild		Moderate		$\chi 2$ value	$\chi 2$ table value $p < 0.05$
		f	%	f	%		
1.	Age • 60 – 65 Yrs • 66– 70Yrs	14 12	35.00 30.00	09 05	22.50 12.50	0.09NS	Df=1 3.841
2.	Sex • Male • female	05 21	12.50 52.50	2 12	05 30.00	0.01NS	Df=1 3.841
3	Education • Illiterate • Primary • Secondary	12 08 06	30.00 20.00 15.00	07 06 01	17.50 15.002 .50	1.22NS	Df=2 5.991
4.	Duration of joint pain(in years) • 1yrs • 2yrs • 3yrs • >3yrs	02 04 04 10	05.00 10.00 10.00 25.00	04 04 05 07 -	10.00 10.00 12.50 17.50	2.32NS	Df=3 7.815

***significant NS- not significant df –degree of freedom Table value-1.686**

Table XVI -Presents the association between the demographic variables and degree of symptoms.

The table shows that there was no association between demographical variables with the degree of symptoms.

CHAPTER V

DISCUSSION

In the discussion section, the researcher draws conclusions about the meaning and implications of the finding. This section tries to unravel what the results mean, why things turned out the way they did and how the results can be used in practice.

This study is focused on assessing the effectiveness of stretching exercises on pain, symptoms and performance of activity among old age people with osteoarthritis staying in old age home.

Table I to II presents the frequency distribution of the demographic characteristics of the samples

Table 1 - Frequency and percentage distribution of the samples according to personal characteristics.

Table I explains the personal characteristics of the samples in experimental and control group. The data reveals most of the samples are aged between 65 to 75 years, females, and illiterate.

The present study findings are supported by a study done earlier by **Karol M** to assess the prevalence of osteoarthritis in old age people. Clinical and radiological findings showed that most of the old age people are between the age of 65 and 75yrsof age.

Table II - frequency and percentage distribution of the samples according to joint pain related information.

Out of 20 samples in the experimental group13 (65%) samples had joint pain in one knee and 7(35%) samples had the same in both the knees. In the control group

10(50%) samples had the pain in one knee and other half had the pain in both the knee.15 (75%) samples in experimental group and 13 (65%) samples in control group had joint pain during the activities. Remaining samples had pain in all the time. In both the group nobody was taking any treatment for joint pain.

Table III to V presents the pain in the old age people.

Table III - Before intervention, all the samples 40(100%) in the experimental group and in the control group had moderate pain. After intervention in the experimental group 18 (90%) samples showed mild pain, rest of the 2 (10%) samples showed moderate pain and where as in the control group it remained same.

The present study findings are supported by the **Rosa UH, Velasquez Tlapanco (2011**) on the effectiveness of isokinetic therapeutic exercises in patients with knee osteoarthritis. The findings showed that there was a significant reduction in pain after giving intervention.

Table IV- In the experimental group before the intervention the mean score of pain was 21.55 and it reduced to 15.30 after the intervention. In the control group it remained the same before and after the observation. Statistically there was a significant difference in the mean score of pain in experimental group after the intervention ($t = 10.95^*$, $df = 19$, $P<0.05$).

Table V- In the experimental group the mean score of pain was (21.55) and it reduced to (15.30) compared to control group (22.70) after the intervention. The experimental group showed a significant reduction of pain ($t =8.40^*$,$df –38$, $p=0.05$).

Table VI to X presents the symptoms in the old age people.

Table VI -This table shows the frequency and percentage distribution of the experimental group according to the degree of joint symptoms before and after intervention. The joint symptoms were knee stiffness, knee grinding and clicking and knee movements. In the experimental group the majority of samples had a marked reduction in knee stiffness.

Before the intervention, 13 (65%) samples had mild and 7 (35%) samples had moderate knee stiffness. After the observation all the 20 (100%) samples had mild knee stiffness. In the experimental group there was a similarity in the frequency and percentage of samples regarding knee grinding and clicking and knee movements, before and after intervention.

Table VII - This table concludes that in the control group there was no change before and after the observation. There was a similarity in the frequency and percentage of samples regarding knee movements, knee grinding & clicking and knee stiffness.

Table VIII - This table shows that in the experimental group, there was a marked difference found in the mean of knee stiffness ($t=7.45^*$,df= 19, $p<0.05$).Before the intervention the mean score of symptoms of knee stiffness was 8.95 and it reduced to 6.65 after the observation. And there was no much difference in the mean score of knee clicking and grinding sound and knee movement before and after the intervention.

The present study finding is supported by **An b et al (2004)** on the effect of health-promoting traditional Chinese exercise, known as Baduanjin, in treating knee osteoarthritis. The findings showed that there was a significant reduction in pain, stiffness, and disability after giving intervention.

Table IX - This table shows that there were no marked reduction of symptoms in the control group .Before the intervention the mean score of symptoms of knee stiffness was 8.15 and mean score of knee clicking and grinding sound and knee movement was 0.70 respectively. After the intervention the mean score of symptoms remained the same.

Table-X - In the experimental group the mean score of symptom was 10.00 and it was reduced to 7.30 compared to control group (9.50) after the observation. The experimental group showed a significant reduction of pain ($t = 3.51$, $df = 38$, $P<0.05$).

Table XI to XV presents the performance of activity in the old age people.

Table XI- This table shows the frequency and percentage distribution of the experimental group according to aspects of performance of activity before and after intervention. In the experimental group there was no difference in the frequency and percentage of samples regarding household and outdoor activities. Before intervention, majority of the samples

19(95%) had moderate difficulty .After the intervention, 16(80%) of the samples had mild difficulty. In daily activities, before intervention, half of the samples had mild difficulty and the rest had moderate difficulty. In movements, before intervention, 14(70%) of the samples had mild difficulty and 6(30%) of the samples had moderate difficulty in performing the activity whereas after intervention, all the samples showed mild difficulty. The table concludes that there was a significant reduction in difficulty to performing the activity especially in the case of outdoor and household activities.

Table XII - In the control group there was no difference in the frequency and percentage of samples regarding household and outdoor activities. Before the intervention all the samples in both the groups had moderate difficulty. After the intervention 2(10%) samples had mild difficulty and 18(90%) samples had moderate difficulty to perform the household activities and 1(5%) sample had mild difficulty and 19(95%) samples had moderate difficulty in performing the outdoor activities.

Before the intervention 15(75%) samples had mild and 5(25%) samples had moderate difficulty in performing the daily activities and 13(65%) samples had mild and 7(35%) samples had moderate difficulty for knee movement. After the observation it remained the same.

Table XIII - In the experimental group the level of difficulty for the performance of activity after intervention was less than before intervention .There was a drastic difference found in performance of activities in the aspects of household activities and outdoor activities before and after the intervention. Before intervention the mean score of performance of activity in the aspects of household activities was 48.33 outdoor activities 47.91,daily activities 32.96,movements 30.93 where was a slight difference in the performance of activities after the intervention 34.58 for household activities,34.16 for outdoor activities ,25.4 daily activities ,24.53 for knee movements respectively. ($t=11.0^*$ $df=19 p<0.05$)for household activities, ($t=7.90^*$,$df=19$,$p<0.05$) for outdoor activities,($t=9.39^*$, $df=19$,$p<0.05$)for daily activities, and for knee movements, ($t=8.73^*$, $df=19$,$p<0.05$.).

The findings of the present study is supported by **Osamu Aoki (2008)** on effects of home-based knee stretching exercises on knee range of motion and Gait in patients with Knee Osteoarthritis and gait speed in patients with knee osteoarthritis. The findings show that there is a significant improvement in the performance of activity.

Table XIV In the control group, the level of difficulty for the performance of activity showed the same before and after the intervention. Before intervention the mean score of performance of activity in the aspects of household activities was 49.16, outdoor activities 47.91, daily activities 31.71, and knee movements 31.56, whereas there was no significant difference in the performance of activities after the intervention

Table XV This table shows that the mean score of difficulty for performing activity in experimental group was slightly higher than the control group before intervention. However statistically there was no significant difference between the mean score of performance of activity in experimental and control group before intervention (t =1.43at df -38,p = 0.05).After the observation the mean score of experimental group was reduced to 24.30 and for the control group 31.65,and the experimental group showed a significant reduction in difficulty to perform the activities (t=12.43*,df -38, p=0.05).

Table XVI Association of demographic variables with study variables.

Table XVII Association of demographic variables with symptoms

The table value shows that there was no association between the demographical variables and degree of symptoms.

DISCUSSION

CHAPTER VI

SUMMARY, CONCLUSION, IMPLICATION AND RECOMMENDATIONS

In this chapter the summary of the study, summary of the findings, conclusion, implication and, recommendations are presented.

SUMMARY OF THE STUDY

The main aim of the study was to determine the effectiveness of stretching exercises on pain, symptoms and performance of activity of old age people with osteoarthritis living in an old age home at Erode.

The conceptual framework of the study was based on the Callista Roy's Adaptation theory. The research design used in this study was quasi experimental pretest post test control group design. The independent variable of the study was stretching exercises. Pain, symptoms and performance of activities were the dependent variables.

The sample size consisted of 40 inmates of the old age home (20 samples in experimental group and 20 in control group), selected by purposive sampling technique. In the pretest data on pain, symptoms and performance of activity was collected, using modified KOOS rating scale by interview method. For the experimental group, stretching exercises was taught using a teaching plan in two groups of male and female separately, followed by exercising every day for 15 minutes for 30 days in the presence of investigator. Post test data on pain, symptoms and performance of activity was gathered from both the groups on the 30^{th} day. The data was analyzed using descriptive and inferential statistics.

SUMMARY OF THE FINDINGS:

Demographic data

In both the group most of the samples were aged between 60-65yrs, females, and illiterate. Most of the samples in both the group had joint pain more than three years

Pain, Symptoms and Performance of activity in experimental and control group

Pain in experimental and control group

All the samples 20(100%) in both the groups had joint pain before the intervention. After the intervention on 30th day, 18 (80%) samples had mild pain only. In the control group there were no changes in the degree of pain in baseline and at subsequent observation.

Symptoms in experimental and control group

Majority of the 13(65%) samples in both the group had showed moderate joint symptoms before the intervention. Among all the symptoms knee stiffness was found to be significant. Mean score of knee stiffness was (8.95) before intervention. It reduced to (6.65) after the intervention. In the control group there were no changes in the symptoms in baseline and at subsequent observation on 30th day.

Performance of activity in experimental and control group

Majority of the samples 19(95%) had moderate difficulty in performing the household and outdoor activities and equal number of the samples had mild and moderate difficulty in performing the daily activities and regarding knee movement. In the experimental group significant improvement was shown in performing the activities after the observation especially household and outdoor activities. 16(80%) showed mild difficulty after the intervention in the experimental group. This shows the effectiveness of stretching exercises.

SIGNIFICANT FINDINGS

- There was a significant reduction of pain of the experimental group after the intervention compared to the control group.
- There was a significant reduction of symptoms of the experimental group after the intervention compared to the control group.
- There was a significant improvement in the performance of activity of the experimental group after the intervention compared to the control group.

- There was no association between the demographical data and symptoms in the old age people.

CONCLUSION

The findings of the study concluded that there was a significant reduction in the degree of pain, symptoms and improvement in the performance of activity in the experimental group after the intervention. It could be finally concluded that the reduction in the degree of pain, symptoms and activity in the experimental group could be attributed to the effect of stretching exercises. The control group without intervention did not show any difference in the degree of pain, symptoms and performance of activity after 30 days.

IMPLICATIONS

The findings of the study have implication for Nursing Education, Nursing Service.

Nursing practice

Nurses play an important role in providing care to the old age people. The findings of the study indicate the benefit of exercises to old age people with osteoarthritis The health team members should be encouraged to teach the exercise to the old age people. They should be also encouraged to emphasize the present study findings to the management of the old age home and encourage the management to appoint the separate trained person to teach the exercise to the old age people. Stretching exercises are cost-effective. So it can be implemented in nursing practice in all the settings.

Nursing education

The findings of the study emphasize the effect of stretching exercise on pain symptoms and performance of activity. The importance of various exercises during the old age period can be taught to the nursing students and graduate nurses and this can be incorporated in the care of old age people. This will help the aged to cope with pain symptoms and performance of activity.

Nursing administration

The nursing administrators can arrange in-service education, regarding complimentary therapies to the nursing personnel.. The nurse administrator should take more responsibility to implement these exercises for old age people.

Nursing research

The study is a preliminary set up for exploring the concept of effectiveness of various types of exercises and reduction of pain symptoms and performance of activity of old age people. More research studies can be conducted to check the effectiveness of stretching exercises on various other symptom experiences such as anxiety and pain in hospital settings also.

RECOMMENDATIONS FOR THE FURTHER RESEARCH

- The study can be replicated on a larger sample for generalization of the findings.
- The study can be conducted in different settings for different populations
- A study can be conducted to find out the effectiveness of self instructional learning through media.
- A comparative study can be conducted with males and females.

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APPENDICES

APPENDIX – I

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

To

The mother Superior,

Little sisters of the poor

Thindal

Erode

Respected Sister

Sub: permission requested for conducting Nursing research-Reg.

We request you to kindly grant permission for our II year M.Sc Nursing student _____ to do her research in your esteemed Home for Aged and Destitute during the month of July as a partial fulfillment of the University requirements.

The topic is **"A study to assess the effectiveness of stretching exercises on pain, symptoms and performance of activity of old age people with knee Osteoarthritis in a selected old age home at Erode**".

Kindly oblige and do the needful

Thanking You

Yours faithfully

Principal

Place:

Date:

R.V.S. COLLEGE OF NURSING

RVS INSTITUTE OF HEALTH SCIENCES

242-B,Trichy Road, Sulur, Coimbatore - 641 402.
Ph : 0422 - 2687421, 2687480, 2687603, Fax : 0422 - 2687604.
www. nursing.rvshs.ac.in
(Affiliated to the TN Dr. M.G.R. Medical University, Chennai
Recognized by the Indian Nursing Council, New Delhi.)

Mrs. Saramma Samuel
Principal

TÜVRheinland 85 100 001 08290 NABCB QMS 010
DINEN ISO 9001 : 2008 CERTIFIED INSTITUTION

Ref No :

Date.....

To

The mother Superior
'Little Sister's of the poor'
Thindal
Erode

Respected Sir/Madam,

Sub: Permission requested to do project work-reg.

Ms.Binu P.C. IInd year M.Sc.Nursing student of RVS College of Nursing has to perform research study as part of their curriculum.

The topic of her study is

"A study to assess the effectiveness of stretching exercises on pain, symptoms and activities of daily living of patients with knee osteoarthritis in selected old age home at Erode ".

Therefore we humbly request you to grant her permission to do the study in your esteemed institution. We assure you that all details collected will be kept strictly confidential.

Thanking You

Yours faithfully,

For Little Sisters of the Poor
Sr. Rose
Mother Superior

22/8/11
SARAMMA SAMUEL
PRINCIPAL
R.V.S. COLLEGE OF NURSING
242/B, TRICHY ROAD,
SULUR, COIMBATORE - 641 402

APPENDIX-II

REQUISITION LETTER FOR CONTENT VALIDITY

From

30104601

M.Sc (N) Student,

RVS College of Nursing,

Sulur, Coimbatore- 641402

To

Through the principal

Respected Sir/Madam

Sub : Letter requesting opinion and suggestion of experts for establishing content validity of the tool.

I am a M.Sc (N) student in RVS College of Nursing, sulur, Coimbatore in the specialty Medical Surgical Nursing. As per the requirement for the partial fulfillment of this nursing degree under the Tamil Nadu Dr. MGR Medical University, I have selected the following topic for dissertation. **"A study to assess the effectiveness of stretching exercises on pain, symptoms and performance of activity of old age people with knee Osteoarthritis in a selected old age home at Erode".**

I kindly request you to go through the research tool and validate against criteria given in the sheet.

Thanking you

Yours faithfully

Place:

Date:

APPENDIX – III

CERTIFICATE OF CONTENT VALIDITY

This is to certify that tool developed by 30104601, MSc Nursing II year student, R.V.S. College of Nursing, Sulur, and Coimbatore to collect data on the problem.

"A study to assess the effectiveness of stretching exercises on pain, symptoms and performance of activity of old age people with knee osteoarthritis in a selected old age home at Erode".

Is validated by the undersigned and she can proceed with this tool to conduct the main study.

Name and Address:

Signature :

Seal :

Date :

APPENDIX -IV

CRITERIA RATING SCALE FOR VALIDATION

INSTRUCTION

The expert is requested to go through the following criteria for evaluation of check list. Three columns are given for response and a column for remarks. Kindly place a tick mark in the appropriate column and give remarks.

INTERPRETATION OF COLUMNS

Columns I - Meets the criteria Columns II - Partly meets the criteria

Columns III - Does not meet the criteria

S.No	Criteria	I	II	III	Remarks
1.	**Scoring** - Appropriateness - Adequacy - Accurateness - Clarity - Simplicity				
2.	**Content** - Organization a. Logical Sequence b. Continuity - Adequacy - Appropriateness - Relevance				
3.	**Language** - Appropriateness - Clarity - Simplicity - Concise - Precision				
4.	**Practicability** - Is it easy to score - Does it precisely measure the skill - Utility				

Any other Suggestions

……..…

……

Signature :

Name, Designation :

Address :

APPENDIX-V

REQUSITION LETTER FOR CO- GUIDE

From

30104601

II Year M.Sc Nursing,
R.V.S College of Nursing,
Sulur, Coimbatore.

To

Dr. U.M.Natarajan M.B.B.S., M.D., C.Diab

Professor (Retd) CMCH, Coimbatore

Consultant General Physician / Dialectologist/ Cardiologist

R.V.S. Hospital, Coimbatore.

Respected Sir/Madam,

SUB; Request for Co-Guide

I wish to state that I am II year M.Sc Nursing student of R.V.S College of nursing have selected the below mentioned topic for dissertation as a partial fulfillment for the Master of Nursing degree to The Tamil Nadu Dr.MGR Medical University.

"A study to assess the effectiveness of stretching exercises on pain, symptoms and performance of activity of old age people with knee osteoarthritis in a selected old age home at Erode "

Regarding this I am in need of your valuable help and co-operation by providing services to be a Co-guide for my study.

I humbly request your highness to consider the same do the needful.

Thanking you yours sincerely

Date: Nam

Time:

APPENDIX – VI

RESEARCH TOOL

INTERVIEW SCHEDULE

INTRODUCTION

When we grow old so many changes occur in our body, particularly changes in the joints. These changes give rise to the symptoms like pain, swelling, and stiffness in their joints. This may affect a person's activities of daily living.

PURPOSE

The purpose of this interview is to find out from you, what pain and ache you have at present, while you carry on your daily activities.

INSTRUCTION

-Kindly give information which is asked.

-Your response will be strictly confidential.

PART-1

DEMOGRAPHICAL DATA

1). Sample no/code no :

2).Age

a) 60-65yrs ☐

b) 66-70yrs ☐

c) 71-75yrs ☐

3). Sex

a) Male ☐

b) Female ☐

4). Education

a) No Schooling ☐

b) Primary ☐

c) Secondary ☐

d) Collegiate education ☐

5). Financial support

a) Pensioner ☐

b) By family ☐

c) Charitable trust ☐

6). How many years are you suffering from joint pain?

a) 1 yrs ☐

b) 2 yrs ☐

c) 3 yrs ☐

d) >3 yrs ☐

7) Is one or both the knee joint does have joint pain?

a) One knee ☐

b) Both the knee ☐

8) In general how often you have joint pain?

a) All the time ☐

b) Sometime ☐

c) While taking rest ☐

d) During activities ☐

9) Do you take any treatment for joint pain?

a) Yes ☐

b) No ☐

PART-2

MODIFIED KOOS RATING SCALE

TO ASSESS THE PAIN, SYMPTOMS AND PERFORMANCE OF ACTIVITY

INSTRUCTION

Kindly answer to the following questions

SL NO	ITEMS	0	1	2	3	4
	PAIN					
P1	Do you feel the pain in your knee?	Never	Monthly	Weekly	Daily	Always
	How much pain do you experience while	No pain	Mild pain	Manageable pain	Disturbing pain	Unbearable pain
P2	Straightening knee fully					
P3	Bending knee fully					
P4	Walking on flat surface					
P5	Climbing upstairs					
P6	Going downstairs					
P7	At night while in bed					
P8	while Sitting					
P9	while lying					
P10	Standing upright					
P11	While twisting your knee					
P12	While pivoting your knee					

	SYMPTOMS	0	1	2	3	4
Sy1	Do you have knee stiffness when you wake up in the morning (if yes how long is the duration of stiffness)	No	Few min	Few hrs	Long hrs	Whole day
Sy2	Do you have knee stiffness after sitting,					
Sy3	Do you have knee stiffness after lying					
sy4	Do you have knee stiffness after resting					
		Never	Once in a while	Once in a month	Once in a week	Always
Sy5	Do you feel a sense of grinding when your knee moves (like two stones rubbing together)					
Sy6	Can you hear clicking when your knee move					
		Always	often	Someti-mes	rarely	Never
Sy7	Can you straighten your knee fully?					
Sy8	Can you bend your knee fully					

	PERFORMANCE OF ACTIVITY How much difficulty have you experienced during the daily activities like	**0** No difficulty	**1** Little difficulty	2 Severe difficulty	**3** need Assistance	**4** Unable to perform
A1	Climbing the stairs					
A2	Going down the stairs					
A3	Rising from sitting					
A4	Standing					
A5	Bending to pick an object from floor					
A6	During sitting					
A7	Walking on flat surface					
A8	Getting into the bus					
A9	Getting out of the bus					
A10	Going shopping					
A11	Putting on stockings					
A12	Rising from bed					
A13	Taking off socks					
A14	Lying in bed(turning over ,maintaining knee position knee position)					
A15	Getting in to bath					
A16	Getting out of bath					
A17	Sitting					

A18	Getting into toilet					
A19	Getting out off toilet					
A20	While doing Light domestic duties(cooking)					
A21	While doing Light domestic duties (dusting)					
A22	While doing Light domestic duties (washing clothes)					

SCORING AND SCORING INTERPRETATION

Pain

SCORE	SCORING INTERPRETATION
0 - 16	Mild pain
17 - 32	Moderate pain
33 - 48	Severe pain

Symptoms

SCORE	SCORING INTERPRETATION
0 - 10	Mild symptoms
11 - 21	Moderate symptoms
22 - 32	Severe symptoms

Performance of activity

SCORE	SCORING INTERPRETATION
0 - 29	Mild difficulty
30 - 58	Moderate difficulty
59 - 88	Severe difficulty

APPENDIX-VII

LESSON PLAN ON DEMONSTRATION OF STRETCHING EXERCISES FOR OLD AGE PEOPLE WITH KNEE OSTEOARTHRITIS

LESSON PLAN

Topic	:	Stretching exercise
Number of samples	:	4 to 5 at a time
Duration	:	15 minutes
Place	:	Private room
Method of teaching	:	Discussion cum demonstration
Medium of instruction	:	Tamil

Central objective **:** At the end of the teaching, old age people will acquire knowledge on stretching exercise and will be able to carry out the same in the following days.

Specific objectives **:** The old age people will be able to

- Define what is osteoarthritis
- List down the signs and symptoms of osteoarthritis
- List down the common joints affected by osteoarthritis
- Explain the management of knee osteoarthritis
- Explain the type of exercise for knee osteoarthritis
- Define the meaning of stretching exercise
- Describe the purpose of stretching exercises
- Explain the types of stretching exercises
- Demonstrate stretching exercises

Sl No	Time	Specific objectives	Content	Teaching & learning activity	Av aids
1	1mt	Introduction	**INTRODUCTION** **Good Morning to all.** When we grow old many changes occur in our body, particularly changes in the joints. These changes give rise to problems like pain, swelling, and stiffness in the joints; this may affect a person's ability to perform the activities of daily living	Introducing the topic by asking questions.	
2	1 mt	Define What is osteo-arthritis	**Osteoarthritis** It is a degenerative joint disease affecting unilateral or bilateral knees characterized by progressive loss of joint cartilage that leads to pain, joint stiffness, joint swelling, joint instability and muscle weakness.	Picture of join	what is osteoarthritis
3	2 mt	List down the symptoms	**Signs and Symptoms of osteoarthritis** • Fever • Fatigue • Swelling • Severe Joint pain	List the symptoms of joint pain	What are the signs and symptoms of osteoarthritis

4 5	1mt 5mt	List down the common joints affected by osteo-arthritis Explain the management	• Crepitation • Joint stiffness **Common joints affected by osteoarthritis** OA affects most commonly the hands, spine, feet and the large weight bearing joints such as hip, and knees. **Management of knee osteoarthritis** There are different method of treatment for reducing the osteoarthritis**,** **Medications** • Non steroidal anti-inflammatory drugs (NSAIDs). Types of NSAIDs include aspirin, ibuprofen, and naproxen. Other medications or supplements that you may use include: • Corticosteroids injected right into the joint to reduce swelling and pain • Over-the-counter remedies such as glucosamine and chondroitin sulfate • Capsaicin (Zostrix) skin cream to relieve pain • Artificial joint fluid (Synvisc, Hyalgan) can be injected into the knee to relieve pain for 3 - 6 months **Alternative treatments** • Acupuncture is a treatment based on Chinese medicine	Describing Explaining	Which are the common joints affected by osteoarthritis What are the management of knee osteoarthritis

			Surgery Severe cases of OA might need surgery to replace or repair damaged joints. Surgical options include: • Arthroscopic surgery to trim torn and damaged cartilage • Changing the alignment of a bone to relieve stress on the bone or joint (osteotomy) • Surgical fusion of bones, usually in the spine (arthrodesis) • Total or partial replacement of the damaged joint with an artificial joint (knee replacement, hip replacement, shoulder replacement, ankle replacement, elbow replacement) **Lifestyle changes** Staying active and getting exercise helps maintain joint and overall movement. Water exercises, such as swimming, are especially helpful. Other lifestyle recommendations include: • Applying heat and cold • Eating a healthy, balanced diet • Getting rest • Losing weight if you are overweight • Protecting the joints **Physical therapy** Physical therapy can help improve muscle strength and the motion of stiff joints, as well as your sense of balance Massage therapy may also help provide short-term pain relief.		

6	5mt	Describe the type of exercise for knee osteo-arthritis	. **Type of exercises for knee osteoarthritis** 1. **Range of motion exercises (stretching or flexibility exercise**) this exercise help to maintain normal joint function by increasing and preserving joint mobility and flexibility. 2. **Strengthening exercise** help to keep weak joints stable and comfortable and protect them against further damage 3. **Endurance exercise** which includes aerobic exercises which increases the heart rate and help to supply oxygen more efficiently all over the body and it helps to build stronger muscles.	Describing	What are the types of exercises for knee osteoarthritis
7	1mt	Define stretching exercise	**Stretching exercise -meaning** It is a form of physical exercise in which a specific skeletal muscle or muscle group is deliberately elongated to its fullest length by extending the knees, joints in order to improve their muscle elasticity. In this study it includes calf muscles stretch and quad muscle stretch.	Defining	What is stretching exercise
8	2mt	Explain the purpose of stretching exercise	**Purposes of exercise** Regular exercise for all the aged people will help to , • Improve the blood circulation • Increase flexibility and range of motion • Prevent injury.	Explaining	What are the purposes of stretching exercise

9	1mt	List down the types of stretching exercise	• Reduce pain, symptoms • Improve posture • Relieve Stress **Types of stretching exercise** • Calf muscle stretch • Quadriceps stretch • Hamstring stretch • Gluteal stretch	explaining	What are the type of stretching exercises
10	10mt	Demonstrate the stretching exercise	**Stretching exercises** Exercise no .1 **1. Calf muscle stretch** • First warm up by walking for 5 minutes in the room. • Then stand straight by facing a wall and keep both the legs together with your forearms up against the wall. • Stand with one leg far in front of the other and lean forward against a wall. i.e., first forward the right leg and Step back with	Demonstrating	Demonstrate the technique, explain each steps, Re demonstrate, group practice,

			the left leg. • Keep the back heel flat on the floor • Slowly bend the right knee and keep the back knee straight • Bend the right knee until you feel a gentle stretch in the left leg calf • Hold the leg in 30 seconds in stretching position • Slowly relax. • Bring back both the legs in first position. • Repeat the exercise again for 5 times in right leg. • Repeat the steps with other leg • Perform 5 repetitions, 1 time daily	Clarification of doubts	
		Demonstrate the stretching exercises	Exercise no 2 **2. Quadriceps stretch** • Walk for 5 minutes • Stand straight and bend right knee • Grab front of the right ankle and bring heel to buttocks with one hand as far as possible • Support the other hand on the chair for balance	Instruction and discussion	

11 12	1mt		• Keep knees together. • Point knee toward floor. • Hold for 30 seconds • Bring back the leg on the same position • Repeat the exercise again for 5 times in right leg. • Then do the other leg. **Conclusion** Now we have discussed about the osteoarthritis and the exercises to reduce the osteoarthritis problems of your joint. And you have to do the exercise regularly for 15 min duration. **Bibliography** 15. Barker K. (2003) "Exercise for knee osteoarthritis London": Curr opin Rheumatol company. 16. Krishner Carolyn (2002) "therapeutic exercise,Foundation and technique",(4th ed),new delhi ,Jaypee brothers. 17. Richard Laliberate with Virginia Byers(2003)"the Everyday arthritis solution"Readers digest association, **18.** Brunner and suddarth. (2007). "Text book of Medical surgical nursing", 11 th edition. Philadelphia: J.B, Lippincott Company.		

Kd;Diu:-

xU kdpjd; KJik milAk; nghOJ mtdJ clypy; khw;wq;fs; Vw;gLfpd;wd. Fwpg;ghf mtdJ %l;Lfspy; khw;wq;fs; Vw;gLfpd;wd. ,J Nghd;w khw;wq;fspdhy; ekJ clk;gpy; rpy mwpFwpfs; fhzg;gLk;.

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1. typ
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gad;fs;:

,e;j Muha;r;rpapd; %yk; > ehk; mwptJ vd;d vd;why; kdpjdpd; clypy; VjhtJ typ kw;Wk; typ rk;ge;jkhd khw;wq;fs; Vw;gLfpwjh? vd;gij mwptjw;F

topKiwfs;:

Nfl;fg;gl;l Nfs;tpfSf;F rhpahd gjpiy $w Ntz;Lk;.

ePq;fs; $Wk; gjpy;fs; ,ufrpakhf ,Uj;jy; Ntz;Lk;.

gFjp – 1 jdp egh; tpguq;fs;

1. khjphp vz;
2. taJ
    a) 60-65 taJ
    b) 66-70 taJ
    c) 71-75 taJ
3. ghypdk;
    a) Mz;
    b) ngz;
4. fy;tpj;jFjp
    a) vOj;jwptpy;yhjth;
    b) Kjy; epiy
    c) ,il epiy

d) fy;Y}hp

5. nghUshjhu #o;epiy

e) Xa;T+jpak; ngWgth;

f) FLk;g guhkhpg;G

g) kw;wit

6.vt;tsT tUlq;fshf %l;L typ gpur;rpidahy; mtjpg;gLfpwPh;fs;?

h) xU tUlk;

i) ,uz;L tUlq;fs;

j) %d;W tUlq;fs;

k) %d;Wf;F Nky;

7.xd;W my;yJ ,uz;L %l;LfSk; vYk;G Nja;khd gpur;rpidahy; ghjpf;fg;gl;L ,Uf;fpd;wjh?

l) xd;W

m) ,uz;L

8. nghJthf vj;jid Kiw cq;fSf;F %l;L typ gpur;rpid Vw;gLfpwJ?

n) vg;NghJk; ,y;iy

o) khjk; xU Kiw

p) thu ehl;fs;

q) jpdKk;

r) vg;NghJk;

9. ePq;fs; Koq;fhy; %l;L typ gpur;rpidf;F rpfpr;ir vLf;fpwPh;fsh?

s) Mk;

t) ,y;iy

Mk; vd;why; fPo;f;fz;l tw;wpy; ve;j rpfpr;ir Kiw vLj;Jf; nfhs;fpwPh;fs;

u) kUe;J cl;nfhs;Sjy;

v) ,ad; Kiw rpfpr;ir ngWjy;

w) kw;wit ,Ug;gpd; tpthp.

gFjp – 2

khw;wpaikf;fg;gl;l $]; msT Nfhy;

typapd; kjpg;gPL> mwpFwpfs; kw;Wk; jpdrhp thbf;ifapd; nray;ghLfs;.

top Kiwfs;:-

fPo;f;fz;l itfSf;F gjpy; mspf;fTk;.

thpir vz;	**nghUs;**	**0**	**1**	**2**	**3**	**4**
	typ					
p1	cq;fs; Koq;fhypy; ePq;fs; typ ,Ug;gjhf czh;fpwPh;fsh?	,y;iy	khjk; xU Kiw	thuk; xU Kiw	jpdKk;	vg;NghJk;
	ve;j msTf;F ePq;fs; typia mDgtpj;J ,Uf;fpwPh;fs;?	,y;iy	kpjkhd typ	Nyrhd typ	fLikahf	kpf fLikahf
p2	Neuhf Koq;fhiy ePl;Ljy;					
p3	Koq;fhiy KOikahf klf;Fk; NghJ					
p4	rkkhd jiuapy; klf;Fk; NghJ					
p5	gbf;fl;Lfs; VWk; NghJ					
p6	gbf;fl;bypUe;J ,wq;Fk; NghJ					
p7						

p8 p9 p10 p11 p12	,uT gLf;ifapy; ,Uf;Fk; NghJ cl;fhUk; NghJ gLf;f Kw;gLk; NghJ Neuhf epw;Fk; NghJ cq;fs; Koq;fhy;fis jpUg;Gk; NghJ cq;fs; Koq;fhy;fis Row;Wk; NghJ					

	nghUs;	**0**	**1**	**2**	**3**	**4**

	mwpFwpfs;:-	,y;iy	rpy epkplk;	rpy kzp Neuk;	mjpf Neuk;	xU ehs; KOtJk;
8y1	fhiyapy; ePq;fs; vOe;jpUf;Fk; NghJ cq;fs; KOq;fhy; vt;tsT ,Wf;fkhf ,Uf;fpwJ? (Mk; vd;whf vt;tsT Neuk;)					
8y2	ePq;fs; mkh;e;j gpd;Dk; KOq;fhy; ,Wf;Fk; Vw;gLfpwjh?					
8y3	ePq;fs; gLj;jjw;F gpd; KOq;fhy; ,Wf;Fk; Vw;gLfpwjh?					
8y4	ePq;fs; Xa;tpy; ,Uf;Fk; NghJ KOq;fhy; ,Wf;Fk; Vw;gLfpwjh?					
8y5	cq;fs; KOq;fhy;fis mirf;Fk; NghJ miuf;Fk; czh;T Vw;gLfpwjh? (,uz;L fw;fis Nja;f;Fk; NghJ)	vg;NghJk; ,y;iy	vg;Nghjh tJ	khjj;jpw;F xUkiw	thuj;j pw;F xUKi w	vg;Ngh Jk;
8y6	ePq;fs; KOq;fhy;fis mirf;Fk; NghJ rpW rj;jk; Vw;gLfpwjh?					
8y7	cq;fs; KOq;fis KOtJkhf Neuhf itf;f Kbakh?	Vg;NghJk;	mbf;fb	rpy Neuk;	Vg;N ghjht J	,y;iy
8y8	cq;fs; KOq;fhiy KOtJkhf klf;f Kbajh?					

	nghUs;	0	1	2	3	4
	md;whl tho;f;if newp Kiwfs; md;whl tho;f;ifapy; ePq;fs; vt;tsT f\;lq;fis mDgtpf;fpwPh;fs;?	,;y;iy	kpjkhd mrT fhpak;	mjpf mrT fhpak;	Jiz mtrpak;	nra;a Kbatpy;iy
A1	gbf;fl;L VWk; NghJ					
A2	gbf;fl;L ,wq;Fk; NghJ					
A3	mkh;;e;J ,Ue;J vOk; NghJ					
A4	epw;Fk; nghOJ					
A5	xU nghUs; vLf;f jiuia Nehf;fp FdpAk; NghJ					
A6	mkh;e;J ,Uf;Fk; nghOJ					
A7	rkkhd jiuapy; elf;Fk; NghJ					
A8	NgUe;jpy; VWk; NghJ					
A9	NgUe;jpy;,Ue;J ,wq;Fk; NghJ					
A10	filf;F nry;Yk; NghJ					
A11	cilazpAk; NghJ					
A12	gLf;ifapy; ,Ue;J vOe;J ,Uf;Fk; NghJ					
A13	fhYiwfis NghLk; NghJ					
A14	gLf;ifapy; gLj;J jpUk;G NghJ kw;Wk;					
A15	KOq;fhy; Nky; KOq;fhy; ,Uf;Fk; NghJ					
A16	Fspg;gjw;F nry;Yk; NghJ					
A17	Fspj;J Kbj;J ntspNaWk; NghJ					
A18	Mkh;e;J ,Uf;Fk; NghJ					
A19	foptiwf;Fs; ,Uf;Fk; NghJ					
A20	foptiwapypUe;J ntspNaWk; NghJ					
A21	rikf;Fk; NghJ					
A22						

	J}R jl;Lk; NghJ Jzp Jitf;Fk; NghJ.					

kjpg;gpLjy; kw;Wk; kjpg;gpLk; Kiw

typ

mwpFwpfs;

kjpg;ngz;	**kjpg;gpLk; Kiw**
0 - 10	**kpf kpjkhd mwpFwpfs;**
11 - 21	**kpjkhd mwpFwpfs;**
22 - 32	**fLikahd mwpFwpfs;**

nray;ghl;L Kiwfs;

kjpg;ngz;	**kjpg;gpLk; Kiw**
0 - 29	**rw;W fbdk;**
30 - 58	**rpwpJ fbdk;**
59 - 88	**kpf fbdk;**

nray;ghl;L Kiwfs;

kjpg;ngz;	**kjpg;gpLk; Kiw**
0 - 29	**rw;W fbdk;**
30 - 58	**rpwpJ fbdk;**
59 - 88	**kpf fbdk;**

KjpNahHfSf;F Vw;gLk; vYk;G %l;L thj Neha;f;fhd nel;bKwpj;jy; clw;gapw;rpapd; nray;Kiw tpsf;;fg; ghlj; jpl;lq;fs;.

jiyg;G : nel;b Kwpj;jy; clw;gapw;rp

nkhj;j vz;fs; : 4 - 5 Kiw

Neuk; : 15 epkplq;fs;

,lk; : jdpaiw

gapw;Wtpf;Fk; Kiw : fye;Jiuahly; kw;Wk; nra;Kiw tpsf;fk;

gapw;Wtpf;Fk; nkhop : jkpo;

gapw;rpapd; ika Nehf;fk; : ,g;gapw;rp Kiwapd; ,Wjpapy; tajhNdhh;. ,e;j tifahd clw;gapw;rp gw;wpa mwpTk;> mijg; gpd;tUk; ehl;fspy; njhlh;e;J nra;jplTk; cjTk;.

gapw;rpapd; Kf;fpa Nehf;fq;fs; : tajhdth;fs;

1. vYk;G %l;Lthjk; vd;gjd; tpsf;fk; $Wth;.
2. Neha;f;fhd mwpFwpfisr; nrhy;th;.
3. nghJthd Neha;j; jhf;Fk; ,lq;fs; mwpth;.
4. Koq;fhypy; Vw;glf; $ba vYk;G %l;L thjj;ijj; jtph;f;Fk; topKiwfisf; $Wth;.
5. Koq;fhypy; Vw;glf;$ba ve;jtif clw;gapw;rp ,e;j Neha;f;Fj; Njit mwpjy;.
6. clw;gapw;;rpapd; nghUs; vd;d vd;gij tpsf;Fjy;.
7. clw;gapw;rpapd; Nehf;fk; vd;d vd;gij tpsf;Fth;.
8. vj;jid tif clw;gapw;rpfs; cs;sJ vd;W $Wth;fs;
9. clw;gapw;rpfs; nra;Kiwahfr; nra;J fhl;Lth;.

vz;	Neuk;	Kf;fpa Nehf;fk;	nghUs;	fw;gpj;jy; kw;Wk; gbf;Fk; Kiw	kjpg;gpLjy;

1.	1epkplk;		KfTiu: vy;NyhUf;Fk; fhiy tzf;fk;. ekf;F tajhFk; NghJ> ekJ clk;gpy; gy khw;wq;fs; Vw;gLfpd;wd Fwpg;ghf vYk;Gfspy; khw;wk; Vw;gLfpwJ. ,j;jifa khw;wq;fs; typ> tPf;fk;> ,Wf;fk; Nghd;w gpur;ridfis Vw;gLj;JfpwJ. ,it xUtUila md;whl tho;f;ifapy; ghjpg;ig Vw;gLj;Jfpd;wd.	Nfs;tpfspd; %yk; jiyg;ig mwpKfg;gLj;Jjy;	
2.	1epkplk;	vYk;G %l;L thjk;	vYk;G %l;L thjk; vd;gJ Xd;W my;yJ ,uz;L %l;LfSk; rpijthfp> FWj;njYk;G/rt;T Nrjkile;J typ Vw;gl;L> %l;Lfs; tpiug;gile;J> tPq;fp> jirfs; gytPdkilfpwJ.	%l;L vYk;Gfspd; glk;	vYk;G %l;L thjk; vd;why; vd;d?
3.	2epkplk;	Nehapd; mwpFwpfis tpsf;Ff	Neha; mwpFwpfs; 1.fha;r;ry; 2.fisg;G 3.tPf;fk; 4.mjpfkhd %l;L Ntjid 5.cile;j vYk;G 6.%l;L tpiug;G	%l;L typapd; mwpFwpfis gl;baypLjy;	vYk;G %l;L thjk; Neha mwpFwpfs; vd;d?
4.	1epkplk;	Nehahy; ghjpf;fg;Lk; nghJthd %l;Lg;Fjpfis tpsf;Fjy;	vYk;G %l;L thjk; nghJthf iffs;> jz;Ltlk; ghjq;fs;> kw;Wk; mjpf vil jhq;Fk; %l;Lfis cila ,Ug;G kw;Wk; Koq;fhy;fs; gFjpfs; %l;Ltypia eph;thfpf;fTk;> fl;Lg;gLj;jTk; **kUe;Jfs; :**	tpsf;Fjy;	nghJthfg; ghjpg;gilAk; ,lq;fs; vit?
5.	5 epkplk;	Neha; eph;tfpf;Fk; Kiw	];Buha;L my;yhj kUe;Jfs;. mitahtd M];g;hpd;> ,g;&t;gd;> ehg;uhf;]d;. %l;Lfspy; Vw;glf;$ba tPf;fk kw;Wk; typia Fiwf;f fhh;bf;Nfh]; gPuha;L Crpfis nrYj;Jjy;. FSf;Nfh]; mk;ik> kw;Wk; fhd;uha;bd; ry;Ngl; Nghd;w	tpsf;Fjy;	Koq;fhy; if typiaf; fl;Lg;gLj;jy;

			kUe;Jfs;. Nfg;rha;rpd; ([h];bhpf;];) Njhypd; Nkw;gug;gpy; G+rpdhy;; typapy; ,Ue;J tpLjiy ngwyhk;. nraw;if %l;L ePiu Crp %yk; 3 – 6 khjq;fs; tiu cl;r;;nrYj;Jjy;. **khw;W rpfpr;irfs;:** rPd kUj;Jt Kiwahd mf;FgQ;rh; itj;jpa Kiwia ifahSjy; **clw; rpfpr;irfs;:** jirfspd; gyk;> %l;Lfspd; ,Wf;fk; ek;ik rkkhf epiyepWj;j cjTk;. FWfpaf; fhy typ epthuzj;jpw;fhf krh[; rpfpr;ir cjTk; mWit rpfpr;ir mjpfkhf ,Uf;Fkhdhy; khw;W mWit rpfpr;ir nra;a NehpLk;. 1.Nrjkile;j fpope;j [t;Tg; gFjpia Mh;j;Njh];Nfhg;gp mWit rpfpr;ir %yk; rhpnra;jy;. 2.vYk;Gfspd; NkypUf;Fk; mOj;jj;ijj; Fiwf;f vYk;Gfspd; thpiriar; rPh;nra;jy;. 3.jd;Lg;gFjpapy; cs;s vYk;Gfis xd;Wg;gLj;jy;. 4.Koq;fhy; %l;L khw;Wjy;> ,Lg;G vYk;G khw;Wjy;> Njhs;g;;gl;il khw;Wjy;> nfz;ilf; fhy; vYk;G nel;bKwpj;jy; nghUs;: ,J xU Fwpg;gpl;l jir my;yJ jirfis Ntz;Lnkd;Nwh ek;khy; ,ad;wsT %l;Lfis ,Oj;J> mjd; nefpo;j;jpwj;ij mjpfhpf;fpwJ. ,jpy; nfz;ilf;fhy; kw;Wk; ehh;jirfisf; Fwpf;Fk;. tho;f;if Kiw khw;wq;fs;: 1.Cf;fKld; ,Uj;jy;> clw;gapw;rp nra;jy;> ePr;ry; Nghd;wtw;iw filg;gpbf;f Ntz;Lk;. mJ jtpu. ✓ mjpf R+L/Fsph;r;rp Mfpatw;iw rkepiyapy; itj;jy;		

6	2 epkplk;	Koq;fhy; tiffs; tpsf;Ff. (vYk;G %l;L thjk;)	✓ rkr;rPh; czT mUe;Jjy; ✓ Xa;T vLj;jy; ✓ Vilf; Fiwj;jy; ✓ %l;Lfisg; ghJfhj;jy; Koq;fhy; vYk;G %l;L thjj;jpw;fhd clw;gapw;rp tiffs; 1.nel;bKwpj;jy; clw;gapw;rp: ,ay;ghd %l;Lfspd; nray;fis mjpfhpj;J %l;Lf;fspd; ,af;fj;jpw;F cjTk; 2.gyg;gLj;Jk; clw;gapw;rpfs;> gytPdkhd %l;Lfisg; gyg;gLj;jTk;> cWjpg;gLj;jTk;> gpw;fhyj;jpy; Vw;lf;$ba ghjpg;igj; jtph;f;fTk; $bait. 3.jhq;Fk; typikia mjpfg;gLj;Jk; VNuhgpf;]; gapw;rp Nghd;wit ,Ujaj; Jbg;ig mjpfg;gLj;jp> Mf;]p[id clk;gpw;Fj; je;J> jirfis typikg;gLj;JfpwJ. khw;Wjy;> Koq;if mWitr; rpfpr;irapd; Mfpatw;iw KOikahf my;yJ gFjpahf khw;Wjy;.	tpsf;Fjy; ;	nel;b Kwpj;jy; clw;gapw;rp vd;why; vd;d?

vz;	Neuk;	Kf;fpa Nehf;fk;	nghUs;	fw;gpj;jy; kw;Wk;; fw;Fk; Kiw	kjpg;gpLjy;
7.	2 epkplk;	clw;gapw;rpapd; Nehf;fk;	Nehf;fq;fs;: tajhdth;fSf;fhd md;whl clw;gapw;rpfs; 1. ,uj;j Xl;lj;ij mjpfhpf;Fk;. 2. elkhLjypd; cWjpj; jd;ik mjpfhpf;Fk; 3. fhaq;fspypUe;Jg; ghJfhf;Fk;. 4. typfisAk;> Neha;f;fhd mwpFwpfisAk; jtph;f;Fk; 5. cly;> Njhw;w mikg;igr; rPuhf;Fk;. 6. mOj;jj;ijj; jtph;f;Fk;.		
8.	1 epkplk;	ePl;Ljy; clw;gapw;rp tiffis tpsf;Ff.	tiffs; 1.nfhz;ilf;fhy; nel;bKwpj;jy; 2.ehh;jir nel;bKwpj;jy; 3.jirehh; nel;bKwpj;jy; 4.gpd;dpil nel;bKwpj;jy;	tpsf;Fjy;	nel;bKwpj;jy; clw;gapw;rpapd; tiffs; ahit?
9.	10 epkplk;	ePl;Ljy; clw;gapw;rp gw;wp nra;Kiw tpsf;fk;	clw;gw;aprp : 1 1.nfz;ilf;fhy nel;bKwpj;jy;. ➢ Kjypy; 5 epkplk; miwf;Fs; elf;f Ntz;Lk; ➢ gpd;dh; 2 fhy;fisAk; Nrh;j;J Neuhf epd;W> Rtw;iwg; ghh;j;j Kiwapy;> ekJ ,U fuq;fis Rtw;wpd; Nky; itf;f Ntz;Lk;. ➢ tyJf; fhiy Kd;dhy; itj;J> ,lJf; fhiyg; gpd;Gwk; itj;J> Rtw;wpd; Nky; Kd;Gwkhfr; cliyr;	nray;Kiw	nra;Kiw tpsf;fk; mspj;J FOthfg; gapw;rp nra;jy;.

			rha;jy; Ntz;Lk; ➢ gpd;G gpd; Fjpq;fhiyj; jiuapy; rkkhf itj;jy; Ntz;Lk;; ➢ nkJthf tyJ Koq;fhiy klf;fpg;> gpd;Gwk; cs;s Koq;fhiy Neuhf itj;jy; Ntz;Lk;. ➢ 30 nehbfSf;Ff; fhiy ePl;ba Kiwapy; gpbj;Jf; nfhs;Sjy; ➢ nkJthf Xa;ntLj;jy;. ➢ ,uz;L fhy;fisAk; gioa epiyf;Ff; nfhz;L tu Ntz;Lk; ➢ ,Nj gapw;rpia 5 Kiw tyJfhypy; nra;a Ntz;Lk;. ➢ mLj;jfhypy; ,Nj Nghd;W nra;aTk; ➢ xU ehspy; 5 Kiw nra;aNtz;Lk;. ➢ gapw;rp: 2 ehd;F jirfis nel;bKwpj;jy; ➢ 5 epkplk; elf;fNtz;Lk; ➢ Neuhf epd;W tyJ Koq;fhiy klf;fTk;. ➢ xU ifapd; %yk; Kd; Fjpfhiyg; gpbj;J> gpd;Gwkhf nfhz;L tuTk;. ➢ kw;nwhU ifia ehw;fhyp Nky; itf;fTk;. ➢ Koq;fhiy xd;whf itf;fTk;. ➢ Koq;fhiyj; jiuf;F Neuhff; nfhz;L tuTk; ➢ 30 nehbfSf;Fg; gpbj;Jf; nfhs;sTk;. ➢ gpd;GwKs;s fhiy mNj epiyf;Ff; nfhz;L tuTk;. ➢ ,e;jg; gapw;rpia tyJ fhYf;F 5 Kiw nra;aTk;. ➢ kw;nwhU fhYf;Fr; nra;aTk;.		clw;gapw;rpapy; vOk; re;Njfq;fisj; jPh;j;jy;

10 11.	1 epkplk ;	KbTiu	KbTiu: ehk; ,g;NghJ vYk;G %l;L thjk; gw;wpAk;> mijf; Fiwf;Fk; clw;gapw;rpfisg; gw;wpAk; ciuahbNdhk;. ePq;fs; jpdKk; 15 epkplk; clw;gapw;rpfis Kiwahfj; jtwhky; nra;a Ntz;Lk;. 1. ghh;f;fh; Nf. (2003) “Koq;fhy; typf;fhd clw;gapw;rpfs;.” yz;ld;. 2. Hp];dh; fNuhypd; (2002)> rpfpr;ir Kiw clw;gapw;rpfs;> mbg;gil kw;Wk; nray;Kiwfs;. 4k; gjpg;G> GJnly;yp> N[.gp rNfh. 3. Hpr;rh;l; yhypngul; kw;Wk; tph;rpdpah gah;]; (2003)> Mh;j;iul;b]; - jpdKk; epthuzk;. hPlh;]; il[];l; FOkk;. 4. gh;dh; kw;Wk; Rjhh;j; (2007) “kUj;Jt mWitrpfpr;ir kw;Wk; guhkhpg;G ghlg;Gj;jfk;”. 11Mk; gjpg;G> gpynjy;g;gpah.n[.gp.ypg;gpd;fhl; epWtdk;.		

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From

Dr. Sheila Jayaraj

Head, Department of English

RVS College of Arts & Science

Sulur, Coimbatore

09th February 2012

Coimbatore

To

The Principal

RVS College of Nursing

Sulur, Coimbatore

Dear Madam,

This is to certify that I have edited and corrected the thesis given to me by Binu P.C., II M.Sc. Nursing. The corrected copy is handed over to the said student accordingly.

Yours sincerely,

Sheila Jayaraj 9/2/12

HOD of English
R.V.S. College of Arts & Science
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FAX : 0422-2687604 ★ Web : www.rvscas.ac.in ★ E-mail : info@rvsgroup.com

Ref

Date 18-8-2011

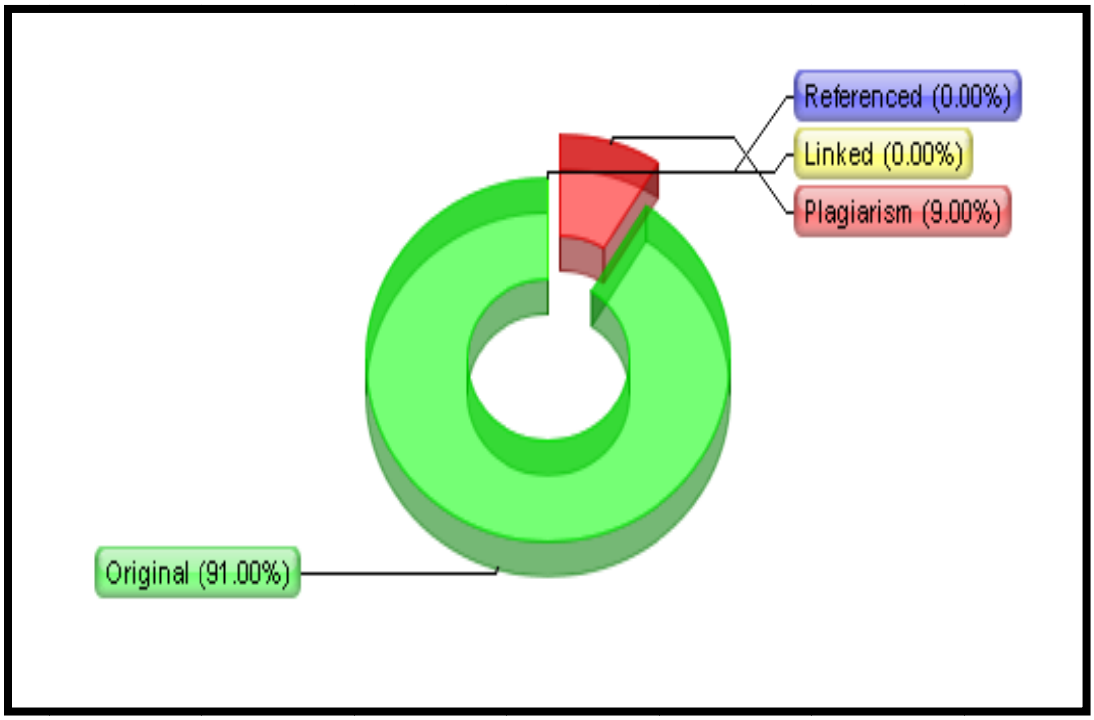
To whom so ever it may concern

This is to certify that Miss. Binu.P.C ,Msc (nursing) is eligible to provide stretching exercises as she has sundergone training for performing stretching exercises.

signature
(S. GERALD)
PHYSIOTHERAPIST I/c.

APPENDIX-X

PLAGIARISM REPORT USING PLAGIARIM DETECTOR



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